Sonified Freaks and Sounding Prostheses
Sonic representation of bodies in performance art

By

Daniël Ploeger

A Thesis Submitted in Partial Fulfilment of the
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Declaration of Originality

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

Signature:

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SONIFIED FREAKS AND SOUNDING PROSTHESES
SONIC REPRESENTATION OF BODIES IN PERFORMANCE ART

SUMMARY

This study is concerned with the role of sound in the presentation and representation of bodies in performance art that incorporates digital technologies. It consists of a written thesis accompanied by a portfolio with documentation of original artwork. Since the 1960s, performance artists have explored the use of sensor technologies to register signals generated by the body and synthesize or control sound. However, both practical and theoretical approaches to biosignal sonification in this field have almost entirely focused on musical (formalist) perspectives, technological innovation, or heightening the performer's and spectator's awareness of their body's physiology. Little attention has been paid to the usually conspicuous interaction between body and technological equipment and the role of the generated sound in the context of cultural critical debates regarding the performing body.

The present study responds to this observation in two ways: Firstly, the written part of the study examines existing biosignal performance practices. It seeks to demonstrate that artists' decisions on the design of sensor technology and sound synthesis or manipulation methods are often complicit in the representation of normative body types and behaviour. Drawing from a concept of the sonified body as a transgressive or 'freak' body, three critical perspectives on biosignal sonification in digital performance are proposed: A reading of body sonification methods from a gender-critical perspective, an inquiry in the context of Mikhail Bakhtin's concepts of the grotesque and the classical body, and a conceptualization of the sonified body as a posthuman prosthetisized body. This part of the study serves as a framework for its second objective: the development of practical performance strategies to address and challenge cultural conventions concerning 'the' body's form and role in society. This aspect of the thesis is developed in conjunction with, and further explored in, the artwork documented in the portfolio.

The practical part of the study consists of three digital performance works. *ELECTRODE* (2011) involves an anal electrode that registers the activity of my sphincter muscle and uses this data to synthesize sound. For this work, I modified a commercially available muscle tension sensor device designed for people with faecal incontinence problems. *Feedback* (2010) encompasses components of a commercially available fetal Doppler sensor intended to listen to the heartbeat of unborn babies. *SUIT* (2009-2010) encompasses several performances that feature a PVC overall equipped with a loudspeaker, sensor interface and Doppler and humidity sensors.

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Weblinks to video documentation of artwork

SUIT (performance #1: hanging/spinning) (2009)
http://vimeo.com/6453592

SUIT (performance #4: jumping) (2010)
http://vimeo.com/16339316

Feedback (2010)
http://vimeo.com/18818354

ELECTRODE (2011)
https://vimeo.com/38581381

CHAPTER ONE
INTRODUCTION AND CONTEXTUAL FRAMEWORK

This thesis forms the written part of a practical and theoretical study into the role of sound in the presentation and representation of bodies in digital performance[1]. Since the 1960s, performance artists including Alvin Lucier, Stelarc, Atau Tanaka and Pamela Z. have explored the use of sensor technologies to register biosignals and generate or control sound. Biosignals are signals originating from a living organism, which may be registered by means of sensors. Despite the variety of biosignal performance[2] practices and the substantial body of writing in the field, the interest of both practical and theoretical approaches to biosignal sonification has almost exclusively been confined to musical (mostly formalist) perspectives, discourses focused on technological innovation, or endeavours to heighten the performer's or spectator's awareness of their body's physiology. Little attention has been paid to the usually conspicuous interaction between body and technological equipment and the role of the generated sound in the context of cultural critical debates regarding the performing body.

The present study responds to this observation in two ways: Firstly, the written part of the study examines existing biosignal performance practices with a focus on the role of sound and sound technology in the body politics of the performing subject. Here, conceptualizations of the sonified body as a transgressive – or 'freak'– body are explored in conjunction with concepts of body sonification as a process of fragmentation or prosthetization of the body. These discussions serve as a framework for the study's second objective: the development of practical performance strategies to address and challenge cultural conventions concerning 'the' body's form and role in society. This aspect of the thesis is developed in conjunction with, and further explored in, the practical work that constitutes the other part of this research project.

A central theme of this thesis is the proposition that body-based performance art practices – when considered from a broader, popular cultural perspective - can be read in relation to historical and current manifestations of freak show performance, and in

[1] The term digital performance designates performance work 'where computer technologies play a *key* role, rather than a subsidiary one in content, techniques, aesthetics, or delivery forms' (Dixon 2007: 3; original emphasis).
[2] I use the term 'biosignal performance' for performance practices which use biosignal analysis for digital sound synthesis or manipulation.

relation to theoretical concepts of the freak show as a challenge to normative ideals of the body in performance. This concept functions as an overarching framework for several more specific explorations of ways to conceptualize a cultural critical approach to biosignal sonification in performance art: the juxtaposition of gender-specific connotations of different biosignal technologies and sonification methods; a concept of sonified biosignals as manifestations of the grotesque; and an exploration of ways to sonically challenge observers' experience of personal space in the context of normative notions of physical interaction. Thus, this research project focuses on the following questions: 1. How can methodologies of biosignal sonification in performance art play a role in a critical engagement with the politics of body representation? 2. How can such an approach to sonic body representation be established in conjunction with readings of body-based performance art practices in the context of freak show performance?

The written part of this study examines a number of biosignal performance practices in the context of the historical and everyday life uses of the sensor technologies involved and the potential extra-musical (or extra-sonic) meaning of the sound. It seeks to demonstrate that artists' decisions on the design of sensor technology and sound synthesis or manipulation methods are often complicit in the representation of normative body types and behaviour. Commonly used sensor technologies to register brain, muscle and heart activity were originally developed for medical purposes and recent technological advances have enabled them to become mass-produced commodities for the medical and entertainment consumer market. I discuss how these aspects may become meaningful in the perception of the work. Taking this cultural critical perspective as a starting point, I explore ways in which biosignal sonification may be used to establish an ambiguous representation of the gender identity of the performer's body or evoke associations with literary scholar Mikhail Bakhtin's concept of the grotesque body. I also investigate how different sound diffusion methods may be applied to affect audience experiences of personal space.

The artwork that constitutes the practical part of the study consists of three digital performance works, which explore the critical strategies developed in the written part. For each work, I designed and constructed performance technologies based on modified technological commodities and open source interface technology such as the Arduino and Make Controller boards. *ELECTRODE* (2011) involves an anal electrode that registers the activity of my sphincter muscle. For this work, I modified a commercially available muscle tension sensor device designed for people with faecal

incontinence problems. *Feedback* (2010) encompasses components of a commercially available fetal Doppler sensor intended to listen to the heartbeat of unborn babies. *SUIT* (2009-2010) consists of several performances that feature a PVC go-kart rain suit with a loudspeaker, Make Controller interface and Doppler and humidity sensors sewn in.

The remainder of this first chapter offers an overview of sensor technologies for the registration of brain, muscle and heart activity and discusses their origins in the history of medical science. This is followed by an examination of key biosignal performance practices ranging from Alvin Lucier and David Rosenboom's early experiments with medical equipment to Pamela Z. and Atau Tanaka's more recent practices with specially developed sensor-based performance devices.

Chapter two lays out the general framework of the study. I analyse the art practice and the media representation of the private personalities of artists Marina Abramović and ORLAN in the context of the history of the freak show and representations of transgressive bodies in film and popular culture. I argue that both Abramović and ORLAN can be read as 'self-made freaks' and draw from this analysis to propose an approach to biosignal sonification that disturbs the repetitive normativity of contemporary culture, building on French economist Jacques Attali's concept of composition. In this approach, the cultural affordances of sound are considered, and used to establish the performer as a 'self-made freak' by means of juxtaposing references to contradicting cultural paradigms.

The following three chapters explore this attitude in different ways. In chapter three, I read the methods of biosignal sonification used in work by Mona Hatoum, Stelarc, Atau Tanaka and Pamela Z. from the perspective of cultural theories of technology and an ecological perspective on sound to suggest that certain aspects of the technology and sound used in these artists' practices afford gender specific associations. Taking my cue from these readings, I propose an approach to biosignal sonification based on the juxtaposition of methods that afford contradicting gender associations. I discuss how I applied this approach in my performance works *Feedback* and *ELECTRODE* with the objective to establish an ambiguous representation of my body, which seeks to complicate gender normative expectations.

Chapter four explores the concept of self-enfreakment through biosignal sonification in the context of British theatre maker and scholar Steve Dixon's (2007) concept of the 'digital double' in conjunction with Russian literary scholar Mikhail Bakhtin's (1984) notion of the grotesque body. I propose that the representations of

parts of my body in *Feedback, ELECTRODE* and *SUIT* can be perceived in the context of Dixon's digital double, but also as representations of the body's insides that seek to transgress the body's boundaries and challenge its wholeness along the lines of Bakhtin's concept of the grotesque body. Taking my cue from these examinations, I suggest that a heightening of the grotesqueness of a sonified body in the conception and media representation of biosignal performance work can be an effective strategy to challenge sanitized and normalized body ideologies.

In the last chapter, I consider the concept of self-enfreakment from the perspective of the popular perception of people with a lack of social skills and understanding of personal space as 'freaks'. In the first part of the chapter, I present a reading of the PVC performance overall used in my performance project *SUIT* from the perspective of theories in posthumanism and discuss how a posthumanist conceptualization of biosignal performance may be relevant as a platform to critically inquire essentialist assumptions concerning gender and species, which appear to underlie much of our everyday behaviour in society. In the second part of the chapter, I explore a specific application of a posthumanist approach in *SUIT*. I conceptualize the sound, and the technology used to generate the sound, in the performances as a 'sonic prosthesis' and connect this concept to psychology research into the experience of proximity, and acoustics research into the perception of distance. I suggest that variations in the spatial diffusion of the sound can be used to evoke different audience experiences of intimacy towards a sonically prosthetisized body and thus facilitate a sonic infringement of the perceiver's personal space. This is followed by a discussion on how the theoretical framework and practice introduced in this chapter may play a role within discourses around the politics of technological body extensions.

History of biosignal technologies

The most commonly used sensors in biosignal performance are galvanic skin response (GSR) sensors to measure sweating, electrocardiogram (ECG) sensors to determine heart rate, electromyography (EMG) sensors to register muscle activity, electroencephalography (EEG) sensors to map brain activity, and Doppler ultrasound sensors to register blood flow. Historically, these technologies were developed in a medical context and primarily used for psychology and physiology research, as well as clinical purposes.

Galvanic skin response, named after early pioneer of 'animal electricity' Luigi Galvano (1791), is based on changes in electrical conductivity of the skin; the more sweat the eccrine glands in the skin secrete, the lower the skin resistance (Ruckmick 1936; Westeyn, Presti and Starner 2006). GSR measurements are performed with an ohmmeter, which registers the electric impedance between two electrodes placed on the skin. In 1888, the French medical doctor Charles Féré published an article that suggested a correlation between psychological processes and changes in skin conductivity (Binswanger 1918). In the early 20th century, this phenomenon drew the interest of psychologist Otto Veraguth who used GSR measurements in word association experiments that inspired Carl Gustav Jung and his assistant Ludwig Binswanger to explore this technology in a similar context. Jung (1907) developed an apparatus for GSR registration in psychological assessments and used GSR measurements in word association experiments to analyse patients' complexes. Jung's and Binswanger's publications suggest that skin conductivity rises when subjects are confronted with an 'emotionally toned' stimulus word (Binswanger 1918: 450); i.e. words that are associated with actual occurrences or seminal events in subject's lives. On the basis of these findings criminology researchers developed the polygraph, commonly known as the 'lie detector'. This device registers a suspect's GSR data, as well as breathing and heart rhythm during interrogations. When a suspect is lying, the skin conductivity often decreases (Trovillo 1939).

From the 1940s, the relevance of GSR measurements in psychology research has declined under the influence of the introduction of EEG and EMG technologies, which offered greater accuracy and detail in measurements of psycho-physical phenomena. Also, the scientific validity of polygraphy tests has come under scrutiny: A 1983 technical memorandum produced by the Office of Technology Assessment (OTA) for the United States Senate, suggests that polygraph tests detect lies better than chance, but states that 'no overall measure or single, simple judgment of polygraph testing validity can be established based on available scientific evidence' (1983: n.p.). Nevertheless, polygraph test results are still admissible as evidence in court in 19 US states. In Europe, however, polygraph results are not considered reliable legal evidence.

Despite the controversy over polygraphy's scientific validity, criminologists across Europe and the US have in recent years developed renewed interest in the use of the polygraph as a tool in the clinical treatment of sex offenders (Chaffin 2011). In this context, successful application is not only dependent on the reliability of the polygraph

outcomes, but also on patients' increased inclination to confess tendencies to undesired behaviour, which is triggered by their fear of being found out by the machine. In addition to their application in clinical and research contexts, GSR sensors are also popular on the consumer market as toy lie detectors.

EMG, EEG and ECG measurements are based on the registration of small changes in electrical potential generated by neurons in the brain and muscles. The principle of bioelectricity was first referred to by French physicist Pierre Bertholon de Saint-Lazare in his treatise *The Electricity of the Human Body* in 1786 (Ruckmick 1936). In the mid-19th century, German physiologist Du Bois-Reymond demonstrated that electric currents generated by the nervous system are connected to its function. The British physiologist Richard Caton subsequently developed a technique to record nerve-electricity with a galvanometer connected to electrodes placed on the skull and the brain of rabbits and monkeys. Using this technique, he discovered correlations between electric currents and specific muscular movements of the animals, as well as general changes in their mental condition. The first EEG recording of a human person was made by psychiatrist Hans Berger at the Psychiatric Clinic of Jena, Germany, in 1924. Berger's 1929 publication on his findings marked the beginning of clinical EEG (Brazier 1961; Bronzino 2000). Nowadays, EEG is used in the diagnosis of epilepsy and other neurological disorders.

An EEG system consists of electrodes, which are connected to signal amplifiers that send their output to a recording device (nowadays usually a computer). EEG systems can consist of single or multiple channels. Each channel involves three electrodes: two electrodes connected to a differential amplifier and a connection to the ground electrode (usually there is only one ground electrode per system). Brain signal amplitudes are very small (1 to 10 μV) and will therefore normally be overshadowed by external noise sources (e.g. electrical appliances). Unlike brain waves, external noise sources will usually be consistent over a relatively large area and therefore equally affect both electrodes connected to the amplifier. The differential amplifier subtracts the signals from the two electrodes so that only the brainwave signals remain. These signals are then amplified with a gain of at least 10^6 in order for them to be detectable by the recording device (Bronzino 2000). In the analysis of EEG, four frequency bands (or EEG rhythms) are distinguished. These rhythms are associated with different mental states: Delta waves are lower than 4 Hz and are predominant when a person is sleeping and not dreaming. Theta waves, between 4 and 7 Hz, occur with drowsiness. Alpha

waves are between 8 and 13 Hz and are associated with a relaxed state of awareness whilst the eyes are closed, and Beta waves (over 13 Hz) occur in a state of alertness, during intense mental activity (Miranda 2006).

In recent years, the decrease in production cost, size and complexity of EEG technology has made simple EEG sensor devices available for computer gaming[3]. Clinical EEG systems usually consist of an array of 20 electrodes[4], but entertainment devices frequently use merely a single-channel system.

Muscle activity is accompanied by electrical signals that travel back and forth between the muscles and the nervous system. Following the same principle as EEG, in EMG these electrical signals are registered by means of two electrodes connected to a differential amplifier, whilst a third electrode serves as ground[5]. EMG research into the functioning of muscle tissue emerged in the 1930s, after the introduction of the concentric needle electrode in 1929. This needle encompassed two electrodes at very close distance and could be placed accurately inside muscle tissue, thus facilitating high precision measurements (Henneberg 2000). A non-invasive alternative to needle EMG is surface EMG (or SEMG), in which electrodes are placed on the skin. SEMG is used in the clinical diagnosis of muscle pain syndromes and the diagnosis and treatment of psychophysiological disorders. Palpated trigger points ('muscle knots') result in the EMG signal making a 'jump sign' and thus facilitate localization and diagnosis of problem areas (Cram 2003). Diagnosis is usually followed by massage or chiropractic treatment.

In 1941, Clifford S. Reusch observed that people who reported to feel uncomfortable or tense showed higher resting position SEMG values in the forearms. Further research suggested that people with neurotic or schizophrenic symptoms, as well as severely depressed people, tend to show elevated EMG values in, and slower recovery toward, resting position. At the University of Chicago, G. B. Whatmore developed the thesis that physiological symptoms result in imbalances in the nervous system. Accordingly, he suggested that patients should be trained to reduce unnecessary muscle contractions by means of SEMG biofeedback exercises. In biofeedback training,

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[3] For example, NeuroSky's *mindwave* is a single channel EEG headset that costs less than $100. http://www.neurosky.com/ [accessed 10/11/2011].

[4] The International Federation in Electroencephalography and Clinical Neurophysiology has adopted the standardized 10-20 electrode placement system to facilitate compatibility between different laboratories (Bronzino 2000).

[5] This process also works in the other direction. I.e. muscles can be stimulated by applying an electric current (supplied by an external power source) to them. This phenomenon has been explored in Dutch artist Arthur Elsenaar's work with electrically stimulated facial muscles (Elsenaar and Scha 2002) and Stelarc's *Ping Body* (1996).

an audio signal or a diagram represents the SEMG signal. The patient observes the sound or the diagram and tries to adjust muscle activity toward a set target (Cram 2003). Since the last decade or so, biofeedback exercises have also become popular in the treatment of incontinence problems caused by malfunctioning sphincter and vaginal muscles (Heymen et al. 1999). The sensor devices developed for this purpose are used in combination with anal and vaginal probes with surface electrodes. Together with technological advances, the widespread demand for this technology resulted in EMG sensors becoming widely available medical commodities[6].

Electrocardiography (ECG) is based on the same principle as EMG and EEG: movement of the heart, which is basically a big muscle, is also accompanied by changes in electrical potential. The first method to register ECG was developed in the Netherlands in 1903 by Willem Einthoven, who was awarded the Nobel Prize in Medicine for his invention in 1924 (Berbari 2000). In Einthoven's setup, electrodes are attached to the subject's left arm, right arm and left leg. A set of three ECG signals is then determined through differential amplifications of the different electrode combinations.

Nowadays, the standard ECG setup encompasses 12 leads, of which six are positioned in different positions on the chest around the heart. Computer algorithms are used to analyse the data and detect irregularities in heart activity. Single or 2-lead ECG observation is commonly used for hospital patients in intensive care or patients who are not confined to bed. (Berbari 2000). Single-lead ECG sensors are also used in cardiovascular sports equipment, such as the heart rate monitor watches developed by the Finnish manufacturer Polar®.

In the 1950s, ECG was introduced for the auscultation of foetal heart rate. The American medical researcher Edward Hon developed a system with a bipolar electrode of which the first pole was connected to the foetus' scalp and the second to the secretions of the maternal vagina (Freeman, Garite and Nageotte 1991). Until the development of this method, fetal heart rate had been monitored with a foetoscope - a stethoscope attached to the observer's forehead - and mainly used for the diagnosis of pregnancy and twins. The more detailed measurements of the ECG method additionally facilitated the diagnosis of hypoxia and asphyxia: conditions where (parts of) the body of the foetus are insufficiently supplied with oxygen.

[6] The medical company *Neen* produces a range of inexpensive EMG Biofeedback products for the consumer market.

Since the 1980s, Foetal ECG (FECG) has increasingly been replaced by observations with Doppler ultrasound sensors. Doppler Foetal Heart Rate detection (Doppler FHR) is based on the principle that ultrasonic signals penetrate human tissue. Bodily materials of increased density, such as muscle tissue, reflect part of the ultrasonic signal. In a Doppler FHR sensor, the signal transducer consists of a transmitter, which sends the ultrasound signal, and a receiver, which registers the reflected signals. If the reflecting tissue is moving, there is a frequency shift in the reflected signal registered by the receiver, a phenomenon also known as the Doppler effect. The sensor device converts this frequency change into an electronic signal, which can subsequently be sonified or visualized.

Canadian anthropologist Lisa M. Mitchell (2001) examines the cultural significance of the increased popularity of Doppler FHR scanning that has taken place from the late 1990s. Nowadays, expecting parents usually experience several ultrasound scanning sessions during pregnancy and are given images or videos of the unborn foetus to take home as memorabilia. Ultrasound scanning sessions are considered useful both in terms of medical observation of the foetus, as well as to 'reduce maternal anxiety and to stimulate parents' emotional "bond" to the fetus' (Mitchell 2001: 4). An increase in popularity of Doppler sensor technology for purposes that are not exclusively medical is reflected in the widespread availability of cheap consumer devices for Doppler heart monitoring, such as the *Angelsounds Fetal Doppler* marketed by the Chinese company Jumper Medical, as well as the emergence of private ultrasound scanning clinics, which offer so-called 'Bonding Scans'[7], the interest of which is solely focused on enhancing the parents' emotional experience of pregnancy.

Mitchell shows that debates around notions of personhood of the foetus, which play an important role in the politics around abortion rights, have been dominated by the evaluation of medical 'facts', whilst other sources of evidence, such as ethics, feminism, religion and humanism have been marginalized. Mitchell argues that these medical 'facts', which are usually represented as merely requiring 'expert decoding', are also 'culturally and socially constructed and subject to multiple interpretations' (2001: 6). For example, in visualizations of Doppler scans in early stages of pregnancy, expecting parents usually do not have the technical knowledge to distinguish the foetus. Here, the sonographer's description and interpretation play a significant role in the parental

[7] http://www.babypremier.co.uk/default.asp?gclid=CLb6zsW_oqwCFYEZ4QodPWUoAA [accessed 1/11/2011]

'bonding' with the foetus; if the sonographer chooses to describe the foetus in terminology associated with personhood, this is likely to affect the expecting parents' perception of the foetus as an autonomous subject.

Sonified biosignals and performance art

The first artwork that used biosignals to generate sound was American sound artist Alvin Lucier's *Music for Solo Performer* (1965)[8]. To realize the work, Lucier borrowed brainwave amplification equipment from the Air Force Cambridge Research Laboratory (Lucier 1976). In the performance, electrodes are attached to the performer's scalp and connected to an EEG sensor that registers the brain's alpha rhythm. These predominantly sinusoidal waves are then amplified and sent to loudspeakers connected to percussion instruments. The movements of the loudspeaker cones trigger the instruments. Alpha rhythm increases when a person is in a certain meditation-like state where attention is not focused (Teitelbaum 1976). Thus, in *Music for Solo Performer*, sound occurs when the performer shows as little activity as possible. Throughout the performance, Lucier sits motionless on a chair in centre stage, most of the time with his eyes closed.

In the late 1960s and early 1970s, a group of artists affiliated with the Aesthetic Research Centre of Canada (A.R.C.) organized by David Rosenboom started exploring the use of biofeedback in artwork incorporating meditation techniques, often motivated by utilitarian objectives to enhance what they called 'shared' and 'personal experience' (Rosenboom 1976: V). In Barbara Mayfield's *T'ai Chi Brainwave Piece* (1974), the sound generated on the basis of the performer's alpha rhythms is intended to heighten physical coordination in the practice of T'ai Chi exercises (Mayfield 1974). In the piece, an oscillator generates a sine wave with the frequency of a partial of a Tibetan cymbal. This sound is then modulated by the performer's amplified alpha wave signal. In Richard Teitelbaum's piece *Organ Music* (1968), one of the performers' brain waves are captured and subsequently used to frequency modulate four voltage controlled

[8] In addition to sound synthesis and transformation, artists and designers have used biosignals to control and synthesize video and trigger robotic devices. Examples of such work are Stelarc's *Third Hand* (1976-1981) in which a robotic hand is controlled with EMG signals, Kevin Warwick's *Project Cyborg 1.0* (1998) and *Project Cyborg 2.0* (2002) which involves control of objects in the environment through signals emitted by implanted microchips, and Catelan artist Marcel-lí Antúnez Roca's performance *Afasia* (1998) in which EMG and relative position data are used to control video projections and robotic devices. Since this research project is focused on sonification of biosignals, a detailed discussion of these practices is beyond the scope of this thesis.

oscillators[9], as well as control filtering and amplitude of these four signals. Simultaneously, the heartbeats of another performer are amplified, whilst the signals are mixed by a third person. The centre frequencies of the four oscillators are set far apart to cover the whole range from treble to bass, and sound is diffused from a large number of loudspeakers positioned around the audience so that audience feel 'as if seated in the midst of a shifting storm of bioelectrical activity, a feeling analogous, perhaps, to being inside a living heart and brain' (Teitelbaum 1974: 39).

A different approach to biosignal sonification is manifest in Australian artist Stelarc's performance setup *Amplified Body* (1970-1994). Rather than using biosignal sonification to heighten embodied experience, Stelarc seeks to use sonified biosignals to present the 'body as a medium of expression' (Linz 1992: n.p.). This 'expression' is not to be understood as what is conventionally known as 'musical expression'. Instead, it is concerned with making perceptible the processes taking place inside the body. Thus, the sound can be read in the context of Stelarc's (1991) claim that the human body is obsolete and its parts should be exchanged for more durable technological components to make the human species suitable for survival in a technologized world. Arguably, the representation of bodily processes as a collection of separate sonic events underlines this perspective: If organic bodily processes can be quantified as electronic data (as is suggested by their sonification through digital processing), the body can be seen as a machinic structure, the parts of which could be exchanged by technological artefacts if desired.

In *Amplified Body*, a range of sensors are attached to the artist's body. In the early versions of the piece, which were realized in the 1970s and 80s, these were mostly medical equipment borrowed from hospitals and universities. EMG sensors with needle electrodes that were inserted 1,5 – 2 cm into the muscles were combined with EEG and ECG sensors. The signals of these sensors were then used to control analogue synthesizer sounds (Linz 1992).

Alvin Lucier, the artists around David Rosenboom, and Stelarc's early *Amplified Body* performances used industry standard medical equipment connected to audio amplifiers and synthesizers. The first biosignal instrument that was specifically developed for performance purposes arguably was STEIM's Cracklebox. The Cracklebox is a touch-based electronic instrument, which was developed by Michel

[9] Voltage controlled oscillators were invented by Robert Moog and used to generate the typical sound of the early electronic Moog synthesizers.

Waisvisz in the mid-1970s. The instrument has a built-in loudspeaker and is battery-powered so it can be used independent from external equipment, just like a traditional analogue instrument. It is played by touching the six electrodes on its front with the fingers. When two or more electrodes are touched, an electric circuit is formed through the performer's body and square wave sounds are digitally synthesized and modulated (Waisvisz 2004). Although variations in the finger constellations and the intensity and surface of touch are the main modes of interaction, the instrument also functions as a GSR device; the performer's skin conductivity influences the sound as well.

Biosensor performance technologies that specifically focused on extracting biosignals did not emerge until the late 1980s. Notable early publications are Hugh Lusted and Benjamin Knapp's (1988; Knapp and Lusted 1990) articles introducing the BioMuse interface. They describe the Biomuse as a 'special purpose signal processing computer designed to acquire low-level neuroelectric and myoelectric signals' (1990: 42). These signals are then converted to MIDI messages which can be used to control digital instruments, such as keyboards, drum computers or custom built devices compatible with the MIDI data protocol. Early versions of the device registered EEG, EMG and EOG (electrooculagraphy, to register eye movement). Over the years, the BioMuse has been developed into a range of separate, commercially available sensors facilitating EEG, EMG, ECG and GSR measurement[10]. The devices can be connected to a computer to source data directly into programming language Max/MSP. Knapp and Lusted commissioned Japanese-American sound artist Atau Tanaka to develop performance work with the BioMuse.

Tanaka approaches performance with sonified biosignals from the perspective of traditional musical instrument design and designates his practice with the BioMuse as sensor-based musical instrument performance (2000), where performance technology serves as a tool to transmit 'the performer's musical expression' (2000: 389). In this approach, it is important that the biosensor interface enables detailed data analysis in order to allow a high degree of control and nuance through the performer's physical activity. The sensor device should be as flexible as possible and show minimal reciprocal interference with the performer's body. In his performances, Tanaka has mostly used the BioMuse to register EMG signals from his forearm muscles. The sophisticated design of the BioMuse enables the detection of detailed movements of the

[10] http://www.biocontrol.com/products.html [accessed 10/7/2011]

fingers, wrist and forearms and thus facilitates the development of a high level of control and virtuosity by the performer. In collaboration with sound engineers, Tanaka developed sonification algorithms that further enhance the performer's control over the sound processing during a performance and explore the diverse expressive possibilities of this new instrument. In his concert piece *Tibet* (2002), for example, EMG signals and relative position sensing are used to modulate sound generated by circular bowing of Tibetan bowls (Knapp and Tanaka 2002). One of the motivations behind *Tibet* is to explore combinations of instrument performance based on touch (bowing the bowls) and performance without physical contact with the sound source (EMG and relative position sensing). To allow a more detailed control over complex sound synthesis algorithms, the sound processing in *Tibet* is based on a model of multimodal interaction. In multimodal interaction, signals originating from different sources are fused to control a single processing activity, thus facilitating a high level of control and complex modes of interaction. In Knapp and Tanaka's model, an EMG sensor registers muscle activity of the performer's forearms, whilst a gyroscope registers the relative position of the performer's body. This data is then combined to control the electronic transformation of the sound of the Tibetan bowls.

Whereas Tanaka's interest focuses on the exploration of biosensor technology in the context of the tradition of classical musical instrument performance, American performer and voice artist Pamela Z. uses biosignals to trigger sounds with gestures in more narrative frameworks. In her performances *Typewriter* (1995) and *Voci* (2003), she uses a BioSynth™ - a sensor device similar to the BioMuse – to trigger and transform sound recordings with EMG data. In these works, the device is used to trigger sound samples of a typewriter through several different typewriting related gestures. A typing movement of the fingers triggers the clicking sound of the type hammers hitting the paper, whilst a horizontal gesture of the arm results in the sound of a carriage return accompanied by a bell.

In the beginning of the 1990s, Stelarc collaborated with sound engineer and artist Rainer Linz in the further development of his *Amplified Body* setup. Instead of the synthesizers triggered by signals from medical equipment, the work now incorporated custom-built sensors and computer software designed by Linz. This new setup facilitated processing of a much greater range of biosignals, resulting in highly complex sound textures. In addition to more sophisticated EEG, EMG and ECG sensors, the work now also encompassed electronic switches, pressure, motion and distance sensors,

contact mikes on the larynx, as well as ultrasound transducers that detect the artery blood flow of the wrist (Linz 1992). In a performance, the data generated by the different sensors is fed into the computer program that generates a complex sound texture, combining familiar sounds of medical equipment (the sound of a Doppler flow sensor, for example), synthesis based on raw data (low frequency sounds mapped on heart rate and sonification of brainwave signals), and triggering of pre-recorded sounds.

Around the same time as Stelarc's collaboration with Rainer Linz, British-Palestinian artist Mona Hatoum made her installation *Corps Étranger* (1994). Hatoum employed medical technology to make close-up video and sound recordings of the in- and outside of her body. Unlike Stelarc's use of complex and hi-tech sensor and sonification technologies in the later developments of the *Amplified Body* setup, Hatoum seems to deliberately choose to use low-tech sound recording and unmodified endoscopic camera recordings (which are somewhat reminiscent of the 16mm films Stelarc made of the inside of his stomach in the early 1970s). Inside a white cylindrical booth, which can be entered by spectators, video images from an endoscopic camera are projected on the floor. The footage consists of extreme close-up recordings of parts of Hatoum's body: a nostril, the stomach, the vagina, an eyeball, the anus, etc. At the same time, sound recordings of Hatoum breathing (extremely close-miked) and a Doppler flow sensor registering blood flow are played through loudspeakers, which are installed at ear-height inside the booth.

Recent developments in biosignal performance technology have mostly been focused on greater accuracy in obtaining EEG and EMG signals, as well as the development of generic open source algorithms to facilitate more convenient implementation of the technology in performance practice.

Japanese electronic instrument designer and performer Yoichi Nagashima (2003) has developed an EMG sensor device that combines compact design with accurate, low-noise data acquisition. Nagashima's MiniBioMuse is similar to Lusted and Knapp's BioMuse, but because it uses 16 electrodes (the BioMuse uses only 3), in combination with sophisticated noise cancelling circuits, the MiniBioMuse can capture a more detailed array of data based on the performer's forearm muscle activity. Nagashima used this device for his performance *BioCosmicStormII* (2001). In this work, a Max/MSP program uses the large EMG data array to control 16 separate band-pass filters with white noise, 16 individual sine wave oscillators and 10 FM synthesis generators.

Until the 1990s, EEG sensor setups used in biosignal performance could usually not detect more than the performer's general state of concentration and eye-movement. Consequently, there was little possibility for accurate control of sound processing in a performance. Advances in noise cancelling and filtering techniques and a decrease in cost of EEG sensor technology have facilitated the emergence of more sophisticated EEG-based performance systems in recent years.

Music-technology researcher Eduardo Miranda (2006) has introduced a Brain Computer Interface (BCI) system to enable people with physical disabilities to perform and compose music. The generative music program developed for this system uses a machine-learning algorithm, which enables the program to learn generative rules for musical composition based on digitized musical scores it has been given as an example. Combining this with detailed analysis of EEG signals, the system can generate music with elements in the style of classical music composers. As an example, Miranda describes how in one setup the developers chose to let alpha rhythms produce compositional elements in the style of Schumann, whilst a predominance of beta rhythms results in Beethoven-like fragments.

In 2005, 2006 and 2007 working groups at the eNTERFACE summer workshops on multimodal interfaces developed new EEG analysis methods for sound synthesis, as well as setups that facilitated the extraction of detailed data from a combination of biosensors measuring EEG, EMG, ECG, temperature, respiration and blood volume pulse (BVP) (Arslan et al. 2005; Brouse et al. 2006; Benovoy et al. 2007). Combining Brain Computer Interface (BCI) research with music and sound computing in programming language Max/MSP, they designed several open source algorithms that generate sound based on data from a high-end EEG sensor, positioned on the performer's skull following the 10-20 international system. This research facilitated a more detailed differentiation of brain wave lengths than the work done by Lucier and the artists affiliated with the Aesthetic Research Centre of Canada in the 1960s and 70s. Whereas EEG sensors in earlier work could merely register alpha waves, the systems developed at eNACTIVE differentiate between alpha, beta and theta waves. Drawing from BCI research, methods were explored to trigger sonic and visual events with specific mental and physical activities, such as right or left body motion, tongue movement and different combinations of relaxation and concentration.

Apart from the rapid development of sensor-based musical instruments during the late 1990s and 2000s, some artists also regained interest in the exploration of

embodied experience of both performing artists and participating audience members through biofeedback that was initiated by Rosenboom's project in the 1970s. In Japanese media artist Seiko Mikami's *World, Membrane, and the Dismembered Body* (1997), for example, audiences are led into a sound-proof anechoic chamber one at a time and connected to sensors and microphones to register heart and lung activity, after which they are left in absolute darkness to listen to the sonifications of their heart and lungs (Khut 2006). Thus, through audible biofeedback the work heightens the participants' experience of the activity of their own body.

Australian artist George Khut's participatory installation *Cardiomorphologies v.1* (2004) also involves biofeedback based on heart and lung activity. An ECG sensor and a respiratory strain gauge[11] are attached to a participant. Subsequently, she/he sits down in a chair in a darkened space and watches a projection of concentric circles, as well as a bar graph representation of her/his heart rate. The circles expand and contract in accordance with changes in heart rate and breath movement. In addition, the breath movement data is used to trigger a simulated breathing sound, whilst the ECG data is used to control a low pulse sound akin to the sound of the heart. Preceding interaction with the installation, participants are informed by the artist how changes in breath and heart rate - and the relationship between the two - affect the visual and aural aspects of the work. In this way, participants are encouraged to try to affect the form of the work by means of controlling their bodily activity (Khut 2006).

Towards a Critical Approach

Considering the development of biosignal performance since Lucier's *Music for Solo Performer,* the change in accessibility and design of sensor technologies over the past four decades is palpable. Whereas in the 1970s and 1980s, Lucier and Stelarc had to borrow costly and clunky medical equipment from hospitals for their performances, biosensors accurate enough for performance purposes are now available as handy mass-produced commodities, which can be ordered online for a fraction of their cost even a decade ago. Together with the increasing processing speed of personal computers and the development of low-cost prototyping interfaces such as the Arduino board[12], this development has facilitated the design of digital performance technology by artists

[11] A respiratory strain gauge is a band attached around a subject's chest or abdomen and registers the expansion of this band caused by the subject's lung movement.
[12] http://www.arduino.cc/ [accessed 10/11/2011]

independent from medical research environments. Institutions such as the Studio for Electro Instrumental Music (STEIM) in Amsterdam and the annual conferences on New Interfaces for Musical Expression (NIME) and eNACTIVE have become platforms for research into sensor-based performance technologies.

However, as the review above shows, most research and artwork in the field of biosignal performance has been focused on musical aesthetic concerns, technological innovation or raising the performer's or spectator's awareness of her or his body's physiology. Little attention has been paid to the ways in which the technologies used, and the sound generated with them, may afford associations with the cultural context they emerged from and thus affect the perceived meanings of a biosignal performance work[13].

A rare critique of this disinterest in the wider cultural connotations of the sound and technologies used in biosignal performance can be found in acoustician Georg Essl's essay 'On gender in new music interface technology' (2003). Although his essay is concerned with interface technology for sound performance in general, Essl's critique is also applicable to some of the biosignal performance practices I discussed above. His main criticism is that new interface performance work produced by men (and he observes that this is the vast majority of work in the field) seems to categorically ignore the potential gender significance of the technologies and sounds used. Among other work, he compares the video and sound performance *Pikapika* (2001), performed by American dancer and musician Tomie Hahn, with Atau Tanaka's *Tibet*.

In *Pikapika*, which was realized by Tomie Hahn in collaboration with composer Curtis Bahn, Hahn wears an artificially coloured wig and a tight silver suit, reminiscent of Japanese anime and manga aesthetics[14]. In addition, she wears a backpack with a clear plexiglass box in which the performance technology is conspicuously visible. The technology in the backpack is connected to pressure sensors on Hahn's hands and accelerometers which can register two axis of tilt. In the performance, the sensors are used to trigger 'loud mechanical sound', whilst a video projection makes references to 'manga, noise and information overload' (2003: 25). Explaining the design of the technology, the artists indicate that on the one hand, 'it was important not to obscure or encumber the grace and beauty of her fingers', whilst on the other hand the experience

[13] Several recent publications have proposed a cultural critical approach to technological devices in performance, but these studies have not addressed critical perspectives on performance art with sonified biosignals (e.g. Salter 2010, Bay-Cheng et al. 2010)

[14] Manga and anime are Japanese comics and cartoon animation forms.

of a hard, technologized body was heightened by the backpack that 'reveal[ed] flashing lights and seemingly complex circuitry' (Bahn et al. in Essl 2003: 25), thus complicating traditional ideas of femininity by juxtaposing feminine gentility with the image of a technologized body, commonly associated with masculinity. Essl suggests that other aspects of the design of the technology and the performance strategy in the work also seek to complicate gender and other supposedly binary categories: Traditional Japanese dance is juxtaposed with a technological setting that makes reference to Japanese popular culture; The feminine, puppet-theatre dance style used in much of the performance is conflicting with the image of the empowered and powered pop-female suggested by the references to manga and anime. Essl suggests that the work heightens these oppositions in such way that '[c]ategories are not pulled apart but presented at once with a clear questioning of the underlying assumptions that constitute these categories' (2003: 25). That this is the artists' deliberate objective, becomes apparent in the following statement:

> In performance, theory fuses with practice through embodied acts, collapsing established dualities of composer/performer, musician/dancer, and researcher/participant. Pikapika breaks down numerous other dualities: self/other, male/female, machine/body, culture/nature and Hahn's own East/West biracial identity (Bahn et al. in Essl 2003: 25).

Comparing Atau Tanaka's *Tibet* with *Pikapika*, Essl draws attention to the difference in Tanaka's exploration of oppositions in his work. That Tanaka also identifies opposites in his performance practice with the BioMuse becomes clear when he writes that 'the interfaces should provide modes of interaction that are intuitive to allow the performer to articulate his musical intention (control), [whilst] at the same time allow him to "let go" ' (Tanaka and Knapp in Essl 2003: 26). More specifically, he articulates that '*Tibet* explores the interstitial spaces between acoustic sound and electronic sound, between movement and tension, between contact and telepathy.' (2003: 26) However, where Hahn and Bahn set up the binaries in their work as conflicting elements, Tanaka's approach is based on what he describes as 'a notion of *bidirectional complimentarity*' (2003: 26; Essl's emphasis). This is apparent in the way *Tibet* refers to Asian culture by means of the Tibetan singing bowls in the piece: the combination of these Asian artefacts with a Western performance paradigm in the piece is more complementary than oppositional. Essl suggests that this aspect of the work, combined with Tanaka's rather vague objective of performers and audience being able to 'let go' in a performance shows a disinterest in engagement with gendered aspects of body-

technology interaction and suggests an underlying assumption that the cultural paradigms shaping interaction between technology, performer and audience are unproblematic. However, as the work of Hahn, as well as theories in cultural studies of technology (e.g. Cynthia Cockburn 1999a; 1999b) suggest, interaction between bodies and technology is always accompanied by certain gender normative behaviours and expectations.

Although Essl's argument focuses on a comparative analysis of the way in which different performance practices engage with binary oppositions, a more general attitude towards performance technology seems to underlie his writing: Essl's position distinguishes itself from the common attitude in the new music interface scene in that it takes into account how technologies can play an *active* role in their relationship to cultural phenomena outside the realm of purely aesthetic interests. This approach is very much akin to a cultural studies perspective on technology: Scholars in the field of cultural studies of technology have suggested that technological development and social contexts have a mutual impact on each other, so that technological change does not only shape society, but society also influences the course of technological innovations (Bijker, Hughes and Pinch 1987; MacKenzie and Wajcman 1999; McNeill 2007). The development of the typewriter, for example, did not only change the working conditions in office environments; the characteristics of the environments it was used in and the people working with it surely also had an impact on the trajectory of development of the device. Thus, rather than neutral tools that can be used to cleanly transmit musical expression or represent bodies, sensor technologies in performance are always 'coloured' by the cultural context in which they were developed and this - in turn - affects the paradigm they are implemented in. From this perspective, the use of a GSR sensor in biosignal sonification may raise questions as to how the work might relate to the history of the polygraph, the sound of an ultrasound blood flow sensor may draw attention to the familiar role of this technology in the context of pregnancy and gynaecology practices and EMG sensor devices might evoke associations with their recent emergence as a widespread medical commodity for the treatment of incontinence problems. Likewise, the technology in Hahn's transparent backpack is not merely an instrument to generate a sound that may or may not be aesthetically pleasing: As Essl's analysis shows, this technological artefact is also a potential trope of meaning in the perception of the performer's body.

Considering the biofeedback work presented by the Aesthetic Research Centre of Canada in the 1960s and 70s and the more recent work by artists such as Khut and Mikami, we can recognize an attitude to technology that is similar to the biosignal practices that take their cue from traditional musical instrument performance. Although these artists are evidently interested in exploring the embodied experience of performers as well as audience members, their work is not concerned with the way in which the technologies that are used to mediate biosignals draw attention to their cultural background as a potentially meaningful aspect of the work.

For Stelarc, technology and its meaning in a broader cultural context are of primary concern. He argues that in contemporary information society 'machines […] generally outperform us in precision, speed and power' (Stelarc, cited in Abrahamsson and Abrahamsson 2007: 295). Therefore, the human body should be hollowed, hardened and dehydrated in order to facilitate the substitution of organic body parts by technological components (Stelarc 1991). Accordingly, the technology in Stelarc's work often serves as a means to demonstrate how concepts of the body might evolve in a technologized society. Explaining the concept of *Amplified Body* he acknowledges that there is 'a subjective realm' in how one chooses to sonify biosignals, but states that the objective of the biosignal sonification in *Amplified Body* is simply 'a case of reflecting the body's activity' (Linz 1992: n.p.). Thus, similar to the practices I discussed above, Stelarc seems to avoid engagement with the way the process of technological mediation may affect the perceived meaning of the representation of his body. However, as I will discuss in chapter three, his decision to predominantly use sounds of a rather harsh, mechanical quality in the sonification process is very likely to affect the way the materiality of his body is perceived and cannot simply be regarded as an objective reflection.

In response to the apparent absence of cultural critical perspectives in the field, the theoretical and practical explorations of biosignal performance in this research project draw from research in disciplines ranging from popular cultural studies and posthumanism to environmental psychology. After introducing the more general critical framework of my study in the next chapter, I will return to a discussion that draws from cultural studies of technology in a more in-depth analysis of the work of Stelarc, Atau Tanaka, Pamela Z. and Mona Hatoum in chapter three.

CHAPTER TWO
PERFORMANCE ART AS SELF-ENFREAKMENT

How can performance with sonified biosignals complicate and challenge widespread assumptions about 'good' physical appearance and behaviour? In this chapter, I set up a framework for my exploration of this question that draws from a more general consideration of popular cultural representations of body-based performance art practices.. I analyse the art practice and the media representation of the private personalities of former Yugoslavian performance artist Marina Abramović and French artist ORLAN in the context of the history of the freak show and contemporary representational practices concerning transgressive bodies in film and popular culture. I argue that both Abramović and ORLAN can be read as 'self-made freaks'. My decision to start with an examination of the work of Abramović and ORLAN in this chapter, rather than artists who specifically work with biosignal sonification, is motivated by the widespread mass-media coverage of the work and life of these artists, which provides the necessary case study material for my analysis.. Building on this analysis, I then proceed to suggest an approach to biosignal sonification that takes its cue from French economist Jacques Attali's concept of composition as a musical practice that disturbs the repetitive normativity of contemporary culture. In this approach, the wider cultural affordances of the sound are considered and used to establish the performer as a 'self-made freak' by means of juxtaposing references to contradicting cultural paradigms.

Contained transgression: Marina Abramović

A slender woman in a tight white top and tiny matching shorts poses with a colourful beach ball against a backdrop of a sandy beach and a bright blue sea. Her unconcerned smile and the meticulous shapes of her toned body evoke the euphoric atmosphere of an advertising billboard for a new lifestyle product or a glamorous holiday snapshot on the cover of a popular magazine. Yet, the book that carries this image on its cover is concerned with something very different: it is a document of Marina Abramović's performance work between 1969 and 1998 (Pejic and Abramović 1998). Browsing through the book, we encounter images that are in stark contrast with the Barbie setting on the cover: the artist with a pentagram cut onto her stomach with a razor blade and

whipping herself in her performance *Lips of Thomas* (1975), Abramović and Ulay facing each other whilst alternatingly hitting each other in the face in *Light/Dark* (1977) and Abramović dressed in a blood-smeared white robe, in the process of washing 1500 fresh beef bones during her performance *Balkan Baroque* at the Venice biennale in 1997, to name but a few of the performance documentations that most people would find much less comforting than the happy beach party suggested on the cover. Unlike the impression given by the often transgressive nature of Abramović's performances, the photo on the cover presents her as a good-looking woman one could expect to meet on a summer day in a tourist resort.

Figure 2.1. Cover of *Artist Body*

At first sight, we might interpret the photo as an old holiday picture of Abramović in her 20s on a Yugoslavian beach. However, the photo credits on the inside of the cover reveal that the photo was taken in the Maldives in 1995, so when she was in her late 40s. This makes the condition of her body in the photo even more interesting. Why does this 48 year-old body not show any of the common signs of ageing: wrinkles, fat, cellulitis? Did Abramović's body simply stay in this youthful shape because of her radical performance routines encompassing meditation and dieting or does this image reveal a more private fascination with fitness culture and popularly idealized body shapes? Either way, from the perspective of most non-art-specialist audiences, the image on the cover will generally be perceived as 'normal' in that it adheres to accepted norms of beauty and conduct, whereas the performances documented in the book are likely to be considered transgressive.

The photo's location, setting and the fact that it was taken by Abramović's partner at the time (German journalist Michael Stefanowski), all suggest that the picture is a private snapshot that Abramović wilfully supplied for the purpose of the publication. We might think of this choice as some sort of an ironic joke, but considering that this was the most important publication about Abramović's work thus far, this seems unlikely. What, then, might this deliberate juxtaposition of the normative body on the cover and the transgressions of this body inside the book tell us?

Abramović's retrospective exhibition *The Artist is Present* (2010) at the Museum of Modern Art in New York, featured a new performance work in which Abramović sat motionless on a chair throughout the opening hours of the museum for a period of three months, facing audience members who could choose to sit down on a chair opposite her. The exhibition also included re-enactments by young performance artists of Abramović and Ulay performances from the 1970s and 80s, such as *Imponderabilia* (1977), which involves two naked performers standing on either side of a narrow passage way, so that visitors have to move in between and make contact with the two bodies in order to enter the next space.

Commenting on the exhibition, an Internet blogger points out that she is disturbed by Abramović's attempts to 'push the boundaries' by using nudity and violence in her performances and states that the show is 'little else than a freak show and should be in Ripley's believe it or not museum rather than the MOMA' (Socialista 2010), referring to Robert Ripley's 'Believe It Or Not Odditorium', a freak show enterprise that started off in the 1920s with the exhibition of 'human oddities' – usually people with disabilities or other unusual physical traits – and still exists today as a popular exhibition of remarkable (now mostly non-human) phenomena. Comparisons between Abramović's work and freak shows are plentiful: although generally favourable toward the work, *New York* Magazine suggests that people may well perceive *The Artist is Present* as 'a freak-show cliché' (Salz 2010: n.p.) and a populist Serbian newspaper article suggestively asks whether Abramović's work is 'art or a circus act' (Menden 2011: n.p.).

Although Abramović's work is frequently represented as a transgressive spectacle, media representations also often feature the 'private Abramović' as a role-model of the 'ordinary' person. A recent article in the *Süddeutsche Zeitung* first locates the interest of Abramović's work in the 'burdening and injuring of the body' to then emphasize the artist's ordinariness by pointing out that she makes jokes and 'shovels in

fried eggs' during the interview, as well as suggest her adherence to commonplace beauty ideals by highlighting her 'remarkably wrinkle-free face' (Menden 2011: n.p.). Likewise, *The Times* seemingly echoes the message of the photo on the cover of *Artist Body* by describing her as a 'talkative woman, well balanced and extraordinarily youthful looking for her years' before quoting her saying 'I train. I don't smoke. I don't drink' (Gayford 2009: 34). As these examples suggest, the juxtaposition of the transgressive treatment of Abramović's body in her work with descriptions of the private Abramović as an idealized ordinary person concerns more than just the cover and contents of the *Artist Body* catalogue and is also evident in the ever-increasing mass media coverage of her work. Considering this, it is worthwhile to examine the relationship between performance art and mass media more closely.

In the 1980s, performance theorist Philip Auslander (1989) argued that performance art could no longer be regarded as a niche art form situated outside mass-culture. Drawing from cultural theorist Craig Owens (1984), he suggested that post-1970s performance art 'problematizes, but does not reject' (Auslander 1989: 132) the representational forms of popular culture. Much of the performance work of American artist Paul McCarthy, for example, draws heavily from popular culture and advertising imagery. In *Caribbean Pirates* (2005), he assimilates the puppet style of a Disneyland attraction and uses this setting to present an orgy of consumerist transgressions involving ketchup and chocolate sauce.

A development from the other side has taken place as well: since the 1980s, performance art has gradually been getting more attention in popular media and is much discussed outside its traditional niche audience of contemporary art enthusiasts. The success of Laurie Anderson's work on the main-stream music market, initiated by her hit single 'O Superman' in 1981, shows how the blending of popular culture idioms and 'high art' performance contributed to this development. However, the recent media coverage of Lady Gaga's visit to Abramović's *The Artist is Present* (Avalos 2010) and her enthusiasm about the artist's work shows that performance art forms that do not actively engage with popular cultural idioms also enjoy increased interest outside the exclusive circles of 'high art' audiences. Wondering about the mass media compatibility of transgressive performance art like Austrian artist Hermann Nitsch's *Orgies Mysteries Theatres* (1962-), which involve ritual crucifixions of performers and animal slaughter, Auslander suggests that even when performance art does not fit in with mass entertainment idioms 'it can still be recuperated as oddity or freak show' (1989: 122).

This 'recuperation as freak show' is apparent in the association of Abramović with Lady Gaga, who cultivates an image of self-proclaimed freak herself and famously declared to her fans that 'it's OK to be a freak' (Vena 2009). Abramović's work might not be suitable for mass consumption as such, but by presenting it in conjunction with the 'freak brand' Lady Gaga it is conveniently framed as an oddity. A similar strategy can be recognized in a recent television reportage about Stelarc's *Extra Ear* (2006-) project, which concerns the surgical construction of a relief of an ear on the artist's left fore-arm. The Sky News commentator reports that 'freaky as it all may seem, Stelarc believes that his art and science experiments could have wider applications' emphasizing the oddity of the project by adding that 'quite what they'll be is anyone's guess' (skynews 2009).

In the face of this intertwinement of aspects of mass culture and well-known contemporary performance work such as Abramović's, I take a popular culture studies perspective in my examination of the parallel occurrence of 'freaky' and normative representations of Marina Abramović and her work. I place the transgressive mode of representation of Abramović's work in the context of the history of the freak show to subsequently analyse the relationship between enfreakment and accepted modes of conduct and appearance in representations of her work, drawing from a recent study into the representation of transgressive bodies in popular culture and film. I am aware that this approach may raise the suspicion of a reductionist agenda. I would therefore like to stress here that the intention of this chapter is not to suggest that Abramović's work is 'nothing more' than a freak show, nor that Abramović's work is *always* perceived as a freak show outside the realm of dedicated contemporary art audiences. Rather, I am interested to investigate how the fact that her work *affords* this comparison may serve as a conceptual starting point for a critical art practice that consciously plays with juxtapositions of enfreakment and normativity in order to challenge essentialist notions of physical and behavioural norms.

Freak bodies vs. normative bodies

In his study on the history of the freak show in the second half of the 19th and first half of the 20th century, sociologist Robert Bogdan (1988) analyses how showmen constructed and marketed freaks for entertainment and profit. In the show business, the term freak, or 'human oddity', was used for persons with physical or mental traits that were perceived as abnormal by an audience. Bogdan argues that all freaks were

constructed in that the characteristics of the people exhibited were always exaggerated and accompanied by made-up narratives suggesting the respectable or exotic backgrounds of the 'exhibits'. Advertisements for an extraordinarily tall man with the artist name 'Chang the Chinese Giant', for example, represented him in what Bogdan calls the 'aggrandized mode' (1988: 104) by claiming that he was the son of wealthy tea dealers and a 'great scholar and profound thinker' who 'manifest[s] every attribute of a perfect gentleman' (1988: 99). An example of the 'exotic mode', on the other hand, is the representation of the albino brothers Eko and Iko in the 1920s and 30s as ambassadors from Mars who were discovered with the remains of their space ship in the Mojave Desert. Thus, there is an important difference between mere non-normativity and 'enfreakment'. Whereas non-normative behaviour or appearance is merely concerned with a deviation from certain norms within a specific cultural paradigm, a freak is deliberately constructed. Being a freak is not a physical or mental condition, but requires something in addition to non-normativity; it involves 'a set of practices, a way of thinking about and presenting people' (1988: 3) that is focused on the framing of certain physical and mental characteristics of a person in such way that these traits become spectacular in the perception of an audience.

Freak show 'exhibits' were often people we would now refer to as people with intellectual disabilities or with physical impairments, but Bogdan also discusses a category of what he calls 'self-made freaks': Freaks who had no born abnormalities and whose unusual characteristics were entirely made up for the purpose of their exhibition in a freak show. As examples, he describes 'Circassian Beauties' – American or European women who were presented as former members of Turkish harems – and people with excessive tattoos, who were presented as victims of tattooing rituals of indigenous tribes in distant parts of the world. Read in this context, we could categorize the performing Marina Abramović as a self-made freak: her transgressive behaviour is 'made-up' for the purpose of confronting audiences with a non-normative body[1].

Before I continue with an examination of the concept of the freak in context of contemporary culture, it is of relevance to consider the notion of the normative body and acceptable body-related behaviour in contemporary Western society more closely. Maybe needless to say, 'normative' and 'freaky' are no absolute categories; an extreme

[1] Of course, the same could be said about many other performance artists, but for the purpose of my argument I will confine my examination here to Abramović and her work.
[2] See http://www.cosmopolitan.com/quizzes-games/cosmo-cover-gallery [accessed 28/9/2011]
[3] Unlike Richardson, I do not make a distinction between the term 'normal' for traits which are considered

bodybuilder may be seen as a freak by other customers in the supermarket, whilst her or his body is considered normative within the bodybuilding subculture (Richardson 2010). However, building on my discussion of the increased intertwinement of performance art and mass culture above, the concept of the 'normative body' I use in this chapter draws from sociology and cultural critical approaches to notions of 'good', acceptable bodies as they are propagated in mass media representations.

Taking his cue from Max Weber (1948 [1919]), sociologist Chris Shilling (2003) suggests that the increased importance of the representation and conditioning of the body in contemporary Western society can be seen as a response to the decline in the relevance of religion and grand political narratives during the latter part of the 20th century. These developments were accompanied by a disappearance of the certainties religious and political worldviews offered concerning the organisation and understanding of life in general, and the body's regulation in accordance with this, more specifically. Science may have partly taken the place of religion in these concerns, but it has never been able to offer certainties of a similar order. Sociologist Harvie Ferguson (1990) suggests that the closed, well-defined body of the 19th Century has evolved to a more ambiguous and open concept of the body in the 20th Century. Shilling proposes that in the existential and moral void that occurred as a consequence, a focus on the body's physical condition and its appearance is coherent from two perspectives: On one hand, the body can serve as a site to exercise control and thus offer a sense of security in life, which is no longer offered by social structures outside the individual. On the other hand, with the decline of religious explanations of afterlife, death – and the decaying body as its forebode - has become a more prominent trope of cultural anxiety.

The perspective on the body as a site of control, combined with an interest to avoid the signs of ageing, is apparent in the cultural obsession to shape bodily appearance and smoothen out any irregularities or deviations from the ideal of the wrinkle and fat-free body. The fact that only unambiguously gendered body types are accepted and the white body is the norm, offers a further point of stability to the individual in secularized consumer culture. Prototypes of these body types can be found on the covers of magazines like *Men's Health* and *Cosmopolitan.* On the 152 covers of the US edition of *Cosmo* between 1999 and 2011[2], all depicted women are thin, 145 have shoulder-length or longer hair and 150 are white (the only black woman featured is

[2] See http://www.cosmopolitan.com/quizzes-games/cosmo-cover-gallery [accessed 28/9/2011]

Beyoncé; she appears twice). A similar pattern can be seen on the covers of *Men's Health*, which are dominated by white, lean muscular bodies.

The concept of the body as an object that can be adjusted to correspond to an idealized form when the necessary effort and discipline are invested, facilitates an understanding of a person's appearance as a reflection of this person's self (Featherstone 2010). Consequently, people who do not adhere to the ideology of physical self-care are considered 'moral deviants' (Shilling 2003: 5). The effects of the high social relevance of adhering to the 'healthy body ideal' are apparent in research into men's perception of their bodies by health care researcher Jonathan Watson (2000). His empirical study of the body experience of 30 adult men in Scotland suggests that the incentive for men to participate in physical exercise is usually motivated by a desire to improve their 'social self image […] rather than the actual condition of [their] body' (2000: 100). The desire to *look* healthy can thus be read as an attempt to fit in with a comforting social structure where the standard image of the 'healthy body' offers a secure reference point in the shaping of people's lives. Bodies that do not conform to the prototypes of 'the' healthy body presented in the mass media, or complicate the clearly demarcated divisions between gender and racial characteristics of these prototypes, may be experienced as a threat to this stability.

In his book *Transgressive Bodies* (2010), cultural theorist Niall Richardson shows how this obsession with shaping and policing the body is expressed in popular media. On one hand, there is a concern with regulating and conditioning the body so that it conforms to accepted beauty standards in advertising and representations of bodies in popular media, whilst on the other hand, non-normative bodies[3] are displayed for people's entertainment and to ridicule, usually in television shows. Richardson's book investigates how the representation of freaks has gained renewed interest in contemporary mass media and shows how the freak body tends to either be exploited for entertainment purposes or represented in a framework that contains its threatening aspects. Following a strategy of exploitation, muscle worship pornography, for example, fetishizes the non-normative, freakish dimensions of a bodybuilder's body as entertainment for a niche market. Likewise, in 'feederism', men fetishize the bodies of fat women and have a desire to render their partner's bodies more transgressive by

[3] Unlike Richardson, I do not make a distinction between the term 'normal' for traits which are considered 'biological', and 'normative' for characteristics which are considered cultural beliefs. This distinction is problematic in that it presupposes the existence of an essential, biologically defined form of the human body. This concept of humanness has been problematized by theories in posthumanism. I discuss these in chapter five.

feeding them excessive amounts of food. Following the logic of containment, on the other hand, the pre-op transsexual protagonist Bree in the film *Transamerica* (2005) is rendered less threatening to the audience because she is presented as a spinster that has no desire to engage in sexual relationships, thus countering the hetero-normative fear of being seduced by a 'fake woman'. Also, Bree is acted by *Desperate Housewives* actor Felicity Huffman, so the audience knows that she is not really a transsexual; it is 'only' a film. Similarly, in the Farrelly brothers film *Shallow Hal* (2001), the body of the obese female protagonist Rosemary is rendered harmless by the fact that Rosemary is played by Gwyneth Paltrow wearing a fat suit, rather than an actually obese person.

Taking my cue from these analyses, I read the wilful juxtaposition of Abramović's transgressive performance body with normative representations of her private personality in context of Richardson's model of transgression and containment. Abramović's performances are a potential threat to people's understanding of accepted, proper bodily discipline, which is focused on the body's 'healthy' appearance and attainment of the idealized, thin and smooth shape of 'the' feminine body. However, this potential threat is contained by representations that suggest that in everyday life she is an ordinary person that adheres to accepted codes of conduct. The performer who put her bleeding stomach under a heater whilst lying on ice blocks for hours turns out to be a 'well balanced' and 'talkative woman' (Gayford 2009: 34). We are assured that the freak Abramović is 'only' a performance.

The politics underlying this sort of containment of transgressive body (re)presentations in performance art may become apparent when we consider Bogdan's account of the decline of the freak show in the 20th century. Bogdan describes how public interest in the display of people with physical or mental impairments gradually diminished under the influence of developments in medical disciplines. From the end of the 19th century, research into genetics showed that many human abnormalities could be traced back to genetic characteristics and could therefore no longer be marketed as exotic phenomena. Furthermore, people with physical and mental impairments were increasingly claimed as objects of study by the medical world. Scientists argued that freaks didn't belong on stage for the entertainment of the public because they were medical cases that needed to be researched in a scientific environment. In case of the eugenics movement, which emerged around the same time, the threatening potential of these diseased people to spread their 'inferior' characteristics in society was another reason to ban them from public life. This notion of the freak as a diseased person that

should be pitied resulted in an increasing embarrassment about the voyeuristic enjoyment of bodies with physical or mental impairments.

Performance artist and scholar Laurence Harvey (2004) locates spectators' discomfort in the perception of certain work of disabled performance artists in a similar embarrassment. He describes a re-enactment by British performance artist Mat Fraser of a 1950s performance by Stanley 'Sealo the Seal Boy' Berent, a famous freak show performer with phocomelia[4]. Fraser, who has the same condition, reworked a famous Berent stage act with a cigar as a joint rolling scene in a domestic space. Harvey argues that the sense of discomfort audiences experience whilst observing this act lies in their realization of the voyeuristic pleasure they derive from this freak show-like scene. The re-framing of Berent's stage act in a domestic setting heightens the sense of voyeurism and forges the spectators' realization that despite their politically conscious rejection of the freak show format, they nevertheless gain pleasure from gazing at this kind of display of 'human oddity'. Harvey suggests that it is the realization of their 'culpability in the survival of attitudes towards the disabled that have their roots in the freak show' (2004: 74) that makes the spectacle uncomfortable.

In the light of this discomfort in observing disabled bodies (bodies that, in a freak show context, would be regarded as 'born freaks', rather than 'self-made freaks'), the attempts to contain the transgressions of Abramović's work in representations of the normative may be understood as a process that renders the work into an acceptable substitute for the traditional freak show. By means of the contained nature of the transgressive actions in the work, the spectator is reassured that it is legitimate to enjoy this spectacle of the body. Although the performer looks like a real freak, this is actually an 'able' person; there is no need to be politically correct.

Another aspect of the desire to contain these transgressions may be seen in context of the recent revival of the freak show format on television. Richardson shows that although quasi documentary-style TV programmes featuring non-normative bodies for entertainment purposes enjoy considerable success[5], the format is often eschewed among members of the so-called cultural elite. A clear example of this is actor and writer Stephen Fry's public denouncement of commercial network Channel 4 programmes like *Body Shock*, which feature people with rare medical conditions, as an

[4] Phocomelia is a congenital disorder that manifests itself in malformed limbs. The disorder results from genetic inheritance or use of the drug thalidomide during pregnancy. Fraser and Berent were born with underdeveloped arms.
[5] Examples of such television programmes are Channel 5's *Extraordinary People* (2003-), Channel 4's *Seven Dwarfs* (2011), *Supersize vs Superskinny* (2008-) and *Body Shock* (2005-) and ITV's *The Biggest Loser* (2005-).

'embarrassment for all concerned' (Daily Mail 2008). From this perspective, the representation of a performance artist as a person whose work originates from a respectable (and often idealized) life style and thought process constitutes a clear distantiation of this form of high-class entertainment from the consumption of televised transgressive bodies. Looking at the transgressions of performance art is framed as a sophisticated cultural activity, essentially different from the brainless low-brow entertainment of the TV freak show.

Thus, the contained self-made freak is rendered harmless in that she/he is presented in a way that affords the consumption of her or his performance as a politically correct high-brow form of entertainment that is unthreatening to established norms of conduct and bodily discipline. By framing the self-made freak as a model citizen when she/he is not performing, the spectator is re-assured that although the body they observe in the performance might be unsettling their perspectives on the structuring of power through bodies in everyday life, at the end of the day this pretend-freak is a 'decent' person like everybody else. The performance can be enjoyed as a high-class 'circus act' (to echo the Serbian newspaper quoted above) that is entertaining, rather than challenging.

Integrating the freaky and the ordinary: ORLAN

If performance art that transgresses boundaries of accepted appearance and conduct is neutralized by its framing in normative representations of the artist, how could *any* performance that seeks to challenge conventions of the acceptable possibly escape this mechanism? One possibility is the Mat Fraser performance Laurence Harvey describes: Since Fraser has a condition commonly regarded as a physical impairment, he is not likely to be framed as a 'self-made freak' and thus not prone to the containment I discussed above. However, Fraser's performance is also effective because it does not simply present his body in a way that ignores the possibility that it is going to be read as a freak body. Instead, the performance actively seeks to confront the audience with the freak show associations it may evoke and uses this as a platform to challenge people's perception of non-normative bodies. To see how an active engagement with the body's affordance as a 'freak body' may also be an effective strategy in performance art with 'able' bodies, I consider the work of French artist ORLAN.

In her surgery performances (1990-93), ORLAN underwent plastic surgery whilst remaining fully conscious. The surgeries were filmed, accompanied by music and

ORLAN recited prose and poetry about body modification and concepts of beauty, among others, dressed in clothes especially designed for the performances by Issey Miyake and Paco Rabanne. In the operations, ORLAN had her mouth modified to resemble that of Europa in François Boucher's painting *The Rape of Europa* (1732-34), her chin altered to look like that of Venus in Sandro Botticelli's *The Birth of Venus* (c. 1486) and had two implants inserted into her forehead to imitate facial features of Leonardo da Vinci's *Mona Lisa* (c. 1503-1519).

In a video documentary accompanying an interview about her work with *The Guardian* (Jeffries 2009), the interviewer suggests that ORLAN's art might be seen as acts of sheer narcissism. ORLAN responds that she finds it surprising that people are suspicious of exhibitionist artists but never criticize pop-stars for being too exhibitionist. In her opinion, all artists should be narcissist or exhibitionist. What is relevant is whether a work of art 'says something about our society' (2009: n.p.). This can be achieved by narcissistically staging oneself, whilst keeping a critical distance at the same time; in ORLAN's words: '[N]arcissism is important, as long as one doesn't get lost in one's reflection' (2009: n.p.). In her work, ORLAN consciously stages herself in the context of conventional media representations of the body. The surgery performances put her body on centre stage and explicitly thematize notions of physical beauty in a format reminiscent of a reality TV programme, but in contradiction with this framework the work features a diversion from accepted ideas of beauty and thus seeks to provoke – in ORLAN's words - 'a clash with society' (2009: n.p.). ORLAN elaborates on this as follows:

> I am not sure I can change [conventional ideas of beauty], but I can produce images that are different from those we find in comics, video games, magazines and TV shows. There are other ways to think about one's body and one's beauty. If you were to describe me without anyone being able to see me, they would think I am a monster, that I am not fuckable. But if they see me, that could perhaps change (2009: n.p.).

The suggestion that she might be considered 'fuckable' when seen, shows that ORLAN's objective is not to merely render herself into a monster that defies all conventional notions of female attractiveness. This aspect of her work can be read in the context of Auslander's concept of performance art that 'problematizes, but does not reject' (1989: 132) the conventions of mass culture. ORLAN presents her body with features that do not adhere to conventions of beauty, but never to such an extent that her body no longer affords to be experienced as attractive from a main-stream perspective.

This is also apparent in the ambiguous connotations of the surgical modifications of her face. On one hand, the implants in her forehead may be considered as an unattractive mutilation. On the other hand, they imitate facial features of Da Vinci's portrait of Mona Lisa, which is popularly considered as a representation of singular feminine beauty.

What distinguishes ORLAN's self-enfreakment from Abramović's is that ORLAN does not easily slip in and out of her freak-role: the implants are on her forehead and therefore permanently visible. When ORLAN gives an interview about her work, the implants prevent a full representation as 'ordinary person'. No matter how ordinary the topic of conversation, the impression of the ordinary will always be troubled by the freaky implants in her head; the self-made freak and the everyday person ORLAN are integrated into one ambiguous character. This is apparent in the description of the *Guardian* interviewer who states that 'truthfully, Orlan is pretty sane. She greets me courteously at her studio and responds thoughtfully to every question I ask her', whilst at the same time pointing out that the private ORLAN is nevertheless 'freaky' by describing how he goes on a stroll with her in her Paris neighbourhood and '[g]allic jaws drop as she sweeps majestically along [whilst she] ignores the stares of people in cafes' (Jeffries 2009: n.p.). Whilst enfreakment and normativity appear as opposed positions in the representation of Marina Abramović, they are part of the same continuum with ORLAN. It is no longer clear where the ordinary, everyday ORLAN ends and where the transgressive spectacle starts. The spectator is confronted with the unsettling possibility that this separation does not exist; the normative no longer contains the transgressive.

When comparing ORLAN's and Abramović's approach to the representation of their bodies, the issue of exhibitionism in ORLAN's work is also of interest. ORLAN deliberately stages herself in an exhibitionist mode that references the representation of pop stars in mass media, whilst simultaneously problematizing the conventions of beauty that are assumed by this presentation. Looking at Marina Abramović's beach photo again, it is hard not to think of ORLAN's suggestion considering artists as narcissists and exhibitionists. Taking a provocative pose and wearing clothes that show off her perfectly toned body, Abramović appears to demonstrate a narcissistic pride in her body's adherence to mass culture conventions of beauty. Yet, this aspect is barely addressed in Abramović's work, because the transgressive representations of her body in her performances remain strictly separate from the normative framework it is placed

in. Even her autobiographically inspired theatre performance *Delusional* (1994) appears to be conceptualized in indifference to the likelihood that the appearance of her body is associated with a health and fitness life style idealised in popular culture. The work explicitly refers to her personal life through monologues by her mother and father and presents her toned body in an elegant short dress and at some point even includes a scene in black lace underwear and suspended stockings, but it seemingly avoids references to the motivations behind her own urge to display her body in front of an audience in this setting.

Sonic enfreakment

In this thesis, I take an approach to biosignal sonification in performance art that takes its cue from the fascination with normative body regimes that is apparent in Abramović's and ORLAN's work. The exhibitionist tendencies that are apparent in their work are also an important aspect of my own performance practice. I am really quite vain, careful to eat healthy food and a compulsive gym customer. One of the main interests underlying my performance work is to unbalance and complicate the stereotypical expectations concerning the performance of my carefully maintained normative white male body in its interaction with technological commodities. The performance works I developed in the context of the practical component of this research project, which will be introduced in the following chapters, display my body in an explicitly exhibitionist fashion, but then seek to undermine the macho-air of this mode of presentation by deliberately enfreaking my body. Thus, one of the interests in my work is to consolidate my intuitive fascination with, and belief in, the world of magazine-bodies, impulse-buy commodities and fetish technology with my role as a critical theorist who scrutinizes this culture of restrictive bodily regimes and aggressive commodity fetishism.

In my approach, I build on ORLAN's deliberate self-representation as an intertwinement of freak and ordinary person. I explore how simultaneous representations of the 'freaky' and the ordinary can be established in the combined visual and aural (re)presentation of my body. My primary focus is on exploring methods that consider the potential wider cultural meanings of sound and sound producing technological devices. I seek to develop a strategy of self-enfreakment, which is based on the juxtaposition of sonic and visual elements that afford associations with contradicting (normative and non-normative) cultural paradigms. Thus, instead of

establishing a state of permanent enfreakment, as is the case in ORLAN's life and work, I seek to intertwine and complicate concepts of normativity 'inside' performance work by means of a simultaneous occurrence of visual appearances that adhere to accepted standards of beauty and conduct, and aural media that transgress these representations, and vice versa. Obviously, in this pursuit it is first of all necessary to consider *how* sound may play a role in the self-enfreakment of a performing body.

Cultural theorist Mike Featherstone points out that the idealized body propagated in consumer culture usually manifests itself as 'an object of which we have a clear *image*' (2010: 208; my emphasis); we can see it, but it does not smell and cannot be touched. Also, normative body representations in print and on film and television are rarely depicted in close-up in such way that visual perception would facilitate a haptic experience along the lines of Laura Marks' (2002) concept of haptic visuality. Likewise, the distantiated perspective means that processes taking place inside these bodies are inaudible for the perceiver. The only acceptable sound emitted by the 'perfect' bodies on the screen seems to be the sound of the speaking voice, whilst sounds associated with processes taking place inside the body, such as heartbeat or breathing, are usually employed to evoke a sense of uncanniness or transgression.

Although many aspects of notions of bodily normativity have changed over time, this phenomenon is also coherent with the historical association of the voice with idealized notions of the divine and the soul, which can already be observed in Aristotle's writing and the bible, both of which arguably have been of formative influence on contemporary Western culture. In *On the Soul*, Aristotle states that 'voice is a kind of sound of an ensouled thing. For none of the things without soul gives voice' (1987: 178). He suggests that there is a clear separation between the 'higher' qualities of the voice and the merely visceral aspect of other sounds generated by the body:

> For it is not every sound of an animal that is voice, […] rather it is necessary that that which strikes be ensouled and have a kind of imagination, as voice is a kind of sound *with meaning*, and not, like a cough, just the in-breathed air (1987: 179; original emphasis)

The exceptional status of speech is also prominent in the bible, as this example from the book of John shows: 'In the beginning was the Word, and the Word was with God, and the Word was God.' (Holy Bible: King James Version, John. 1: 1)

Contrary to the idealized characteristics attributed to the sound of speech, other sounds emerging from the body's inside are often perceived as repulsive or at least evoke a sense of discomfort. This is apparent in Canadian composer R. Murray

Schafer's references to the relevance of sound in the descriptions of corpses in literature. In German World War I veteran Erich Maria Remarque's novel *All Quiet on the Western Front* (1929) '[the corpses] have their bellies swollen up like balloons. They hiss, belch and make movements' (Remarque in Schafer 1994: 9). Similarly, William Faulkner draws attention to the repulsiveness of sound from the body's interior in his description of the sound of corpses as 'little trickling bursts of secret murmurous bubbling' (Faulkner in Schafer 1994: 9) in his novel *As I Lay Dying* (1930).

That the sound of breath by itself, albeit necessary to facilitate speech, is also excluded from the idealized realm of the voice (cf. Aristotle) is apparent in the heavy breathing sound coming from inside Darth Vader's mask in the *Star Wars* films. This sound plays an important role in the perceived eeriness of the character. In *Star Wars Episode III: Revenge of the Sith* (2005), we see the operation during which the monstrously mutilated body of Anakin Skywalker is inserted into the prosthetic body that enables him to survive. Upon completion of the operation, a close-up shot focuses on his masked face and emphasizes the start of the breathing sound, establishing this sound as a reference to the deformed organic body of which we know that it lives inside the shiny technological shell.

The notion of speech as the only acceptable sound generated by the normative body also seems to have played a significant role in the construction of freaks in the 'exotic mode' in the 19th and early 20th century. Bogdan (1988) describes how Hiram and Barney Davis, two three-and-a-half feet tall men who were exhibited as the 'Wild Men of Borneo' (they were actually Caucasian and grew up on a farm in Ohio), enhanced their enfreakment in an act that involved 'talking strange gibberish and scurrying about the platform snapping and snarling' (1988: 123). Likewise, the made-up story about the Davis brothers' discovery on Borneo points out that when they were found, their behaviour resembled that of wild animals and they 'uttered a strange mixture of gibberish and guttural howls' (1988: 124). Using an opposite strategy, William Henry Johnson (known under the stage name 'Zip'), who was microencephalic but intellectually competent enough to contribute to his own construction as a freak, enacted his freak role by remaining silent because he 'understood that his career […] would be severely curtailed if it was discovered he could speak' (1988: 135).

Thus, the representation of bodily processes outside the body with amplified sound, as in Stelarc's *Amplified Body* (1970-1994) may in itself already transgress the

notion of the normative *image* of the body[6]. However, more specifically, the *choice* of biosignal sonification methods may play a role in the enfreakment of the performer as well. Here, French economist Jacques Attali's 1977 analysis of the history of music in conjunction with the development of society and its regulatory structures is of interest as an early example in this field.

In his book *Noise – The Political Economy of Music* ([1977] 1985), Attali refers to the jazz improvisation term 'to freak freely' to articulate his concept of a musical practice that challenges the normalizing social structures of contemporary culture. Attali's book was written in 1977 and the terminology he discusses primarily concerns jazz practices of the late 1960s and 1970s. It should therefore be taken into account that the 'enfreakment' he articulates may partly be bound to cultural and musical norms that were quite specific to the historical context he examines. However, the fact that Attali's text is unique in its explicit reference to enfreakment in the context of sound makes it an interesting starting point for an exploration of the possibility of a concept of 'sonic enfreakment'.

Although it is difficult to trace the origin of the term 'to freak freely', it appears to have first been used in association with LSD, which emerged as a recreational drug in the United States in the 1960s. 'To freak freely' was used in context of a proposed policy where everybody would have access to LSD and have the freedom to go on a psychedelic trip without supervision and at their own convenience (Stevens 1988). In the American jazz performance scene, the term has been used to designate a free improvisation in which the musicians let themselves 'go' and break through set musical structures, maybe somewhat comparable to the hallucinatory experience of an LSD trip. The character of 'freaking freely' as a liberating experience, not only in a musical sense but potentially also in relation to wider, social restrictions is apparent in this account of a jazz jam session in Philadelphia:

> I don't know if some family foundation made a phat contribution to the Upper Darby police, but for whatever reason we were allowed to *freak freely* after the show for hours in the lot, unlike Friday when they came down on us pretty hard. It was a celebration that a show like that truly deserved and the drum circle kept growing and changing for hours as we danced up a storm (Zig Zag 2000: n.p.; my emphasis)

Attali suggests that 'freaking feely' generates a sonic freak, 'a monster, a marginal' (1985: 142) that represents difference from the main stream. To 'freak' (or to

[6] In chapter three, I suggest that despite this, some of the biosignal sonification methods used by Stelarc may nevertheless reinforce aspects of these images.

'enfreak') is a strategy to challenge musical and social conventions: the production of noise that breaks the sanitized condition of mass culture.

Attali suggests that throughout Western history, the development of musical forms has reflected the dominant social order. The introduction of *equal* temperament in music during the baroque era, for example, went hand-in-hand with the emergence of the capitalist market economy, which is based on *equal* monetary representation of all services and commodities. Music adopts the structures of the culture it emerges from, but because music facilitates an exploration of all possible combinations of this code at a much quicker pace than society as a whole, developments in music often also prophecy future developments in society.

The emergence of the gramophone marked the beginning of what Attali calls the 'society of repetition' (1985: 5). Recordings promote mass production of music on one hand, and the individual stockpiling of music (in the form of records, CDs or data files) on the other hand. With the recording, music is no longer collectively consumed as it was in the concert hall. Consumption of music is individualized (people listen to music in the privacy of their homes) and normalized (music is experienced through identical copies of mass produced recordings).

The normalizing effect of mass production and media broadcasting, which Attali recognizes in the production of music, is also discussed by French social theorist Jacques Baudrillard (1998 [1970]). Baudrillard suggests that media representations of bodies in consumer society construct an image of a standardized body, which has no imperfections or irregularities in order to serve the interests of mass production and commodity fetishism. The body itself becomes a 'psychically possessed, manipulated and consumed object' (1998: 131). On one hand, the body is invested in through consumption of body care goods and services in order to enhance its value as a signifier for social status. On the other hand, the idea of a standardized body promotes the consumption of mass-produced, identical products. Within this logic, the body must be functional for the purposes of consumption and should therefore be meaningless in itself. Since '[i]rregularity or ugliness would bring out a meaning' (1998: 134), the normative body is conceived as a standardized object, its economic function similar to the mass-produced recordings Attali writes about.

In response to this normalizing economy of repetition, Attali proposes the concept of 'composition' as a musical practice that breaks through the repetitive moulds of mass-produced music. He employs the term 'composition' somewhat differently

from its conventional use to describe a mode of music production that emphasizes the combined production and consumption of music, free from the modes of production prescribed by society. In composition, music is produced and played for one's own pleasure, 'inventing new codes, inventing the message at the same time as the language' (1985: 134). Composing is creating 'our own relation with the world and try to tie other people in the meaning we thus create' (1985: 133). Thus, the way music is made and experienced is envisaged to affect the way people experience the role of their bodies in society and complicate the concept of the body as an 'empty' commodity, which Baudrillard refers to.

As an example of a desire for this form of composition, Attali shows how, in the 1960s, black American free-jazz musicians organized themselves so that they could produce their freely improvised music independent from the hierarchical structures of the recording industry and produce and perform whatever they liked. However, Attali argues that free-jazz failed as a successful form of composition, because it became a niche culture that positioned itself outside the cultural mainstream 'after having failed as a takeover of power in repetitive society' (1985: 140).

In Attali's text it never becomes quite clear how a form of composition could emerge that successfully develops independently from the modes of production of mass culture. He argues that composing with existing, predefined instruments 'cannot lead to a mode of production different from that authorized by those instruments' (1985: 141). However, he does not elaborate on what the required new instruments should be like or how they might be produced. It is difficult, if not impossible, to imagine musical instruments or other tools that do not have a certain 'mode of production' inscribed in them; all artefacts are a product of culture and its modes of production, simply because they are produced with the help of tools that are just as well authorizing specific modes of production. This is apparent in the emergence of computer-based musical instruments that has taken place since the 1980s. Although these new instruments are often radically different from conventional acoustic musical instruments (both in terms of the sound they produce and the way they are played) they nevertheless form part of the cultural paradigm of digital technology with its specific regimes of social and economic structures[7]. Taking into account this impossibility to escape the adherence of artefacts to existing modes of production, I propose an approach that seeks to challenge repetitive

[7] I consider this issue more closely in chapter three.

conventions by means of recombining existing codes. By using existing artefacts for purposes that were not foreseen in their design and production, their signification may be complicated and thus undermine their role in the authorization of dominant modes of production and the construction of social hierarchies.

In a manner comparable to ORLAN's use of plastic surgery to unconventional ends, the use of sounds that are commonly associated with specific cultural stereotypes can be used in 'inappropriate' contexts in order to destabilize their assumed universal meaning. A body can be enfreaked sonically if it emits sounds that are considered inappropriate: sounds that 'queer' the expected identity of the body. In this approach, the 'outsider' nature of the freak is not so much the result of sonic characteristics that are radically dissociated from anything else in mass culture. Rather, the enfreakment follows from the occurrence of sounds associated with specific social, gender, age or other characteristics in conjunction with the 'wrong' body or in the 'wrong' situation: Sounds of mechanical construction emitted by a female body that further seems to adhere to all conventions of feminine beauty[8], the healthy body of a young performer in conjunction with the sounds of medical equipment for the treatment of age-related illnesses, or sonic representations of a body's interior projected into a public space.

This approach of 'sonic enfreakment' is first of all based on a concept of sound as a reference to the cultural paradigm of the artefact it originates from. The approach takes its cue from the ecological approach to music and sound described by musicologist and psychologist Eric Clarke (2003). In Clarke's ecological approach, the study of the relationship between the listener and the cultural and natural environment is fundamental, rather than the traditional musicological objective of analysing the formal characteristics of musical compositions. Central to an ecological perspective is the view that 'perceptual information specifies objects and events in the world' (2003: 117). In the association between a sound and an event or object, psychologist J.J. Gibson's term *affordance* is of relevance. Gibson coined this term to designate the *possible* associations or meanings of an object or event to an individual:

[8] Here one could think of Tomie Hahn's performance *Pikapika*, which I discussed in chapter one.

> I have coined this word as a substitute for *values,* a term which carries an old burden of philosophical meaning. I mean simply what things furnish, for good or ill. What they *afford* the observer, after all, depends on their properties... [T]he human observer learns to detect what have been called the values or meanings of things, perceiving their distinctive features, putting them into categories and subcategories, noticing their similarities and differences and even studying them for their own sakes, apart from learning what to do about them (Gibson in Clarke 2003: 118; original emphases)

For example, a conveniently sized rock may afford being used as a weapon or as a raw material in the construction of a building. However, it does not afford use as food or a garment for a human being. Affordance does not only concern interactions with material objects and can therefore also be applied to the perception of sound. The sound of a violin may afford associations with the bourgeois institution of the concert hall, but is less likely to afford associations with a factory. Similarly, the sound of an ultrasound fetal Doppler sensor can afford associations with pregnancy or gynaecology practices, but is unlikely to be perceived as a reference to public spaces such as cinemas or health clubs. This is not to say that affordances are Platonic ideal qualities that are inherent in objects or events, merely awaiting perception. Rather, affordances are dependent on cultural and individual contexts, as well as species: A chair does not afford being sat on by a baby, whilst it has an affordance as food for a termite. Equally, the sound of the Doppler sensor may not afford the association to pregnancy for people who have never been to a gynaecologist or are not familiar with a device like that. Having said this, one can assume certain affordances of an artefact or event, based on knowledge of the cultural context of the perceiver. Thus, consideration of possible affordances of sounds and artefacts can be a useful strategy in the conceptualization of a performance.

My concept of 'sonic enfreakment' draws from Bogdan's 'aggrandized mode' of enfreakment. Similar to Bogdan's concept of the aggrandized freak, 'sonic enfreakment' is different from a mere occurrence of sounds that fall outside normative patterns of expectation. It concerns a deliberate emphasis of the transgression of these patterns that is constructed through a simultaneous heightening of sounds and sound technologies that *do* adhere to idealized modes of conduct and bodily shape and discipline. This juxtaposition of normative and non-normative elements also constitutes a notable difference with Bogdan's aggrandized freak though. Whereas in the construction of the aggrandized freak, freaky traits are clearly demarcated and separate from the freak's celebrated normative characteristics (e.g. Chang the Chinese Giant's supposedly remarkable literary skills are clearly detached from his 'freaky' physical height), my concept of 'sonic enfreakment' foresees a deliberate intertwinement and confusion of

the two, where the sonic aspects of the enfreaked performer simultaneously afford normative and non-normative cultural connotations[9].

This, then, is the 'composition' this thesis is concerned with: Instead of producing sonic products for one's own consumption, as Attali's concept of composition suggests, the consumption of mass produced goods *becomes part of* a new mode of production. Standardized products of mass culture are manipulated to construct a freak body that problematizes the social order inscribed in these commodities' mode of production. Based on a consideration of possible affordances of sounds and artefacts, the sounds of mass-produced commodities connected to a performing body are recombined and diffused in different ways, thus facilitating new perceptions of this body that seek to challenge an unambiguous reading of the body's identity. This strategy of self-enfreakment embraces the narcissim apparent in the representation of Abramović and ORLAN's lives and work, but employs the audience's combined visual and aural perception of my body to juxtapose its glorified normativity with elements that afford associations with contradicting paradigms in order to render my performing body into an ambiguous amalgam of normativity and freakdom.

In the next chapter, I discuss how sound generated with medical commodities that are commonly associated with femininity or bodily deficiency may be used to problematize masculinist representations of a technologized male body. In chapter four, I focus on strategies to use sonified biosignals to fragment the body and display processes from the body's inside in order to create a grotesque freak body where inside and outside, unity and fragmentation are intermingled into a body representation that may be experienced as both critical and humorous. In chapter five, finally, the spatial diffusion of sonified biosignals is employed to create a more mundane freak by means of sonically evoking the experience of an intrusion of personal space.

[9] Here, it must be noted that the focus on the affordances of sound in terms of its wider cultural connotations mean that the concept underlying my strategy of 'sonic enfreakment' is not necessarily sound specific. Although this thesis uses it to develop specific approaches to peformance with sonified biosignals, it could also be developed with a focus on the affordances of visual, olfactory or haptic characteristics of a performer.

CHAPTER THREE
QUEERING THE SONIFIED BODY

In this chapter, I analyse biosignal performance work by artists Stelarc, Atau Tanaka, Pamela Z. and Mona Hatoum from the perspective of cultural theories of technology and an ecological approach to sound. I suggest that certain aspects of the technology and sound used in these artists' practices afford gender specific associations. I propose an approach to biosignal sonification that takes into account and 'queers' these aspects to establish an ambiguous representation of the performer's body, and discuss applications of this approach in my performance work *Feedback* (2010) and *ELECTRODE* (2011). In this chapter, I use the term 'queer' for a strategy to question 'conventional understandings of sexual identity by deconstructing the categories, oppositions and equations that sustain them' (Jagose 1996: 97), which does not necessarily imply homosexuality. In the approach to biosignal performance I will propose, body representations that adhere to gender normative paradigms are complicated by aspects that afford associations with 'inappropriate' contexts that undermine masculine body representations. Thus, this chapter seeks to develop a practical approach to the concept of 'sonic enfreakment' proposed in the previous chapter.

My analyses of the work of Atau Tanaka, Pamela Z. and Mona Hatoum in this chapter are based on my own experiences of their work through performance and exhibition, as well as video documentation. Since Stelarc has stopped performing *Amplified Body*, my analysis of this work is based on video and audio recordings.

Futuristic sounds and 'neutral' technology: Stelarc and Atau Tanaka

Australian performance artist Stelarc's *Amplified Body* performance setup was developed from 1970 until 1994 and involved pioneering experimentation with a range of medical equipment designed for body observation or investigation. Similarly, Atau Tanaka performed with motion sensors and the BioMuse EMG sensor for almost two decades between the early 1990s and the late 2000s.

In the 1990s version of *Amplified Body*, Stelarc's body is equipped with EMG, ECG, EEG and Doppler flow sensors, as well as sonar (to determine the body's relative

position) and accelerometers (to register movement of limbs). The data registered with these sensors is used to synthesise sound or trigger pre-recorded sound with a specially designed computer program (Linz 1996). Sound at the frequency of the performance space's resonance frequency is triggered according to the rhythm of the artist's heart, EEG signals are used to synthesize high pitched sounds and the signal of the Doppler flow sensor on Stelarc's wrist is sonified as an organic, whooshing sound that is also heard during medical examinations of blood flow through arteries and veins in the neck, arms and legs, to name but a few elements of the complex sound textures generated in the performances. During a performance, the generated sound material is distributed over the performance space through loudspeakers.

Strictly speaking, the title *Amplified Body* is a bit misleading. Most of the biosignals registered during the performances are not signals in the audible frequency range, which are then merely amplified. Rather, the biosignals in *Amplified Body* are used to synthesize sounds in the audible range through computer algorithms or to trigger the playback of pre-recorded sounds. Therefore, *Amplified Body* might more accurately be described as 'mediated body'. The sounds generated during a performance are much more a reflection of how Stelarc would *like* to represent himself than a 'technological observation' of his body (of course, even such 'observation' would in itself also not constitute an objective, non-representational act). Before I continue with a more detailed analysis of the sound in *Amplified Body*, I would like to take a closer look at Stelarc's larger body of work.

In most of his work since the 1970s, Stelarc presents his body with technological prosthetic extensions such as a mechanical extra hand (*Third Hand*; 1976-1981), a computer controlled performance harness (*Movatar*; 2000), a pneumatic walking machine (*Exoskeleton*; 1998), and, since 2006, an operationally inserted ear on his left arm, constructed out of artificial cartilage and the artist's own skin (*Extra Ear*). Explaining the motivations behind his performance practice in his provocative 1991 essay 'Prosthetics, Robotics and Remote Existence: Postevolutionary Strategies', Stelarc states that, in contemporary information society, the human body 'is intimidated by the precision, speed and power of technology, and […] is neither a very efficient, nor a very durable structure' (1991: 591). Consequently, he argues, the organic body has become obsolete and we should 'hollow, harden and dehydrate' (1991: 592) it to make it more durable and less vulnerable to enable the attachment and implantation of technological prostheses.

Cultural theorist Amelia Jones (2005) has suggested a reading of Stelarc's rhetoric from a psychoanalytical perspective. Drawing from sociologist Klaus Theweleit's study of literature written by officers of the proto-fascist German Freikorps in the first half of the 20th century, she argues that Stelarc's allusions to a necessity to hollow, harden and dehydrate the body may be read as a masculinist fantasy. In *Male Fantasies* (1989), Theweleit argues that the ideal of a hardened, armoured male body, presented in the novels he examined, is driven by a felt need to reaffirm the phallic prowess of the male body under threat of femininity and the homoerotic. Jones stresses, though, that Stelarc's performance practice, in which the failure of the male body in interaction with technological devices (its 'softness') is 'wilfully' exposed, contradicts the suggested implications of his rhetoric. In the remainder of her essay she therefore focuses on Stelarc's concern with transcending the body, which is arguably expressed by his claim that the visceral body has become obsolete, to conclude that his work may be motivated by a fear of the decay of the body.

In his 1991 article, Stelarc states that '[a]s an object, the body can be amplified' (1991: 591). Thus, *Amplified Body* seems to be conceptualized to demonstrate the object-ness of the body and – following from this – the possibility to 'redesign' this object by inserting technological components and marking the 'obsolescence' of the organic, visceral body. Although Stelarc has not discussed his choice of sonic material in *Amplified Body* in detail, in an interview with Rainer Linz he suggests that his main objective in the choice of sonification methods is 'reflecting body activity [with] sounds that would convey the function of the [body's] signals' (1992: n.p.). Explaining what sort of sounds he is *not* interested in, he mentions that 'the heartbeat could be made to sound like a chime', but suggests that this does not reflect his body's activity. Although Stelarc does acknowledge that there is a degree of subjectivity involved in the choice of sounds, he apparently considers certain sounds are a more objective representation of the body than others, and considers the sonification methods he uses as a truthful representation of the processes taking place in his body[1]. However, if we approach the sound in *Amplified Body* from an ecological perspective, drawing from Eric Clarke's (2003) writing, the possible meanings of the sound appear less straightforward.

[1] Although usually not directly concerned with biosignal sonification, the focus on the representation of body parts in Mark Boyle and Joan Hills' work during the 1970s, which involved microscope photographs and ECG and EEG oscilloscopes, was similarly motivated by the idea that such technologies would enable artists to 'present a version of reality as objectively and truthfully as possible' (http://www.boylefamily.co.uk/boyle/about/index.html [accessed 1/8/2012])

The sounds of medical equipment such as the Doppler sensor used in the setup are familiar to many people and are likely to afford associations with Western medicine practice. The technocratic approach to the body in this discipline, focused on the treatment of symptoms of individual 'components' of the body, may indeed stimulate an experience of Stelarc's body as an object, the structure of which may be 'redesigned'. However, other aspects of the sonic texture suggest more specific characteristics of Stelarc's perspective on his body.

Whilst listening to sound recordings of several *Amplified Body* performances, two aspects were prominent: Firstly, the predominant and most clearly recognisable sound I perceived throughout the recordings was the sound of electro motors, probably originating from contact microphones on the *Third Hand* or other mechanical attachments to the artist's body. Secondly, it struck me that the overall sonic texture of the performances sounded familiar to me. I didn't think much of this, until, whilst sorting out my audio library, I came across a short sound fragment of a performance of *Risveglio di una città* (Awakening of a City) (Russolo 2004), one of Futurist composer Luigi Russolo's early pieces for his Intonarumori ('noise intoners'), performed on reconstructions of the original instruments. Although Russolo's work predates Stelarc's by more than 50 years and the Futurists primarily engaged with mechanical, rather than digital electronics-based technologies, I realized that this was the sound Stelarc's performance had reminded me of: Russolo's layers of rotating factory machine-like sounds, superimposed by powerful impulses reminiscent of the rattling of automated industrial production processes, appeared closely related to the squeaking flow of high pitched sounds (a slipping conveyor belt?) and the repetitive rotation of electromotors combined with chains of hammering impulses (an industrial assembly machine?) in the *Amplified Body* recordings.

I suggest that the prominence of the machinic sound of the electro motor, presented as part of an amplification of Stelarc's body, affords associations of the body's processes with a machinic structure. The title and the information Stelarc gives us about the work suggest that we are listening to mere amplifications of his body. However, the prominence of machine sounds in the sonic texture of the performances promotes an experience of the body as an actual machine, made of plastic and metal. The concept of the body as a machine fits conveniently within Stelarc's idea of the body as an object that can be redesigned and his desire for a 'hardened' body. His choice to feature these sounds so prominently in the performances suggests that, rather than

merely an indifferent act of conveying 'the function of the [body's] signals' (Linz 1992: n.p.), the choice of sounds in *Amplified Body* should be seen as a pursuit to promote Stelarc's body *ideology*.

A more prominent aspect of the sound in the *Amplified Body* performances lies in its kinship to Russolo's noise music though. I suggest that the mechanical texture of this music is likely to afford associations with broader aspects of the Futurist movement and its ideologies concerning the (male) body. The music's rigid, mechanical sonic qualities appear to neatly reflect initiator of the Futurist movement Filippo Tommaso Marinetti's (1973 [1909]) glorification of industrialism and war and the ideal of a machine-like body that would integrate in this violent paradigm. Accordingly, I suggest that Russolo's work and also Stelarc's *Amplified Body* may be interpreted in relation to the Futurist's dream of a superman. Art historian Christine Poggi summarises this vision as follows:

> The Futurist male, "multiplied" by the machine, would exemplify a new superhuman hybrid adapted to the demands of speed and violence. Sportsman, aviator, or warrior, he would be capable of astounding feats of physical prowess. His inner consciousness, modeled on the running motor, would be emptied of all that was private, sentimental, and nostalgic (1997: 20).

This reading of *Amplified Body*'s sound as a prophecy of the 'sonic superman', brings us back to Amelia Jones's critique of Stelarc's rhetoric. A rhetoric, that shows a striking similarity to Poggi's summary of the Futurist body-ideal:

> [The human body] is intimidated by the precision, speed and power of technology, and it is biologically ill-equipped to cope with its new extraterrestrial environment. [...] It is no longer meaningful to see the body as a site for the psyche or the social but rather as a structure to be monitored and modified. [...] [W]e could radically redesign the body, eliminating many of its redundant systems and malfunctioning organs [...] Bodies need not age or deteriorate; they would not run down or even fatigue (Stelarc 1991: 591-93).

Amelia Jones writes that the implications of Stelarc's rhetoric are at odds with his practice, which, she argues, highlights the failure and 'softness' of his body in interaction with technology. However, I propose that Stelarc's approach to body sonification in *Amplified Body* suggests an idealization of the hard body that is very much akin to the tendencies Jones critiques in his rhetoric.

Japanese / American artist Atau Tanaka has described his work with the BioMuse interface as 'sensor-based musical instrument' performance (Tanaka 2000). Tanaka approaches the sensor equipment from the perspective of traditional musical instrument design, where 'the performer's ability to channel his creativity through his instrument' (2000: 389) and the listener's perception of this expression of creativity are

the primary aspects of interest in a performance. Following the approach introduced in the preceding section, it would be possible to consider possible extra-musical meanings in Tanaka's practice. However, when listening to documentation of his performances (BKeeperSystem 2008; localisation 2009; primaudiodan 2008), it becomes apparent that this approach is unlikely to lead to a broader understanding of his practice as a whole. Tanaka's performances with the BioMuse are truly diverse and his variation in sound qualities and modes of expression vary from tranquil and relatively quiet to quite wild. In a performance at Brown University (primaudiodan 2008), for example, EMG data is used to generate rhythmic variations and filtering of the impulses in a stream of rhythmic hammering sounds, followed by a segment in which samples remotely reminiscent of speech are modulated, as well as sped up and slowed down according to Tanaka's gestures. However, in another performance (localisation 2009), about a year later, the sonic texture mainly consists of a continuous whooshing, noise based sound that is gently filtered on the basis of the EMG data.

What is striking in the video documentation of the different work is the way in which in all of the performances our attention is drawn to Tanaka's body: We see a performer standing all by himself next to a laptop, merely attached to a few wires and with black straps wrapped around his forearms, making slightly awkward looking gestures into the air, which are apparently correlated with the sounds one hears. Unlike the expected, conventionally staged music performance experience, where a performer is in physical interaction with a perceptible object - the acoustical musical instrument - Tanaka seems to be interacting with his own body, a body which is strangely wired-up and moves like a sort of digital marionette. Taking into consideration the prominence of his body in the performances, it is surprising that Tanaka's writing pays a lot of attention to the way in which the technological equipment mediates the performer's 'expression', but never seems to consider its role in the representation of his body from a wider cultural perspective. Here, I also find it of interest that the chosen sound in the performances, albeit very diverse and inventive, avoids signification of anything that might be associated with the performer's body (apart from the occasional use of samples of the human voice, which are quickly transformed to a point where they are perceived as formal sonic material). The musical instrument concept, and the computational strategy mapped on this, appear to be a purely formalist and aesthetic principle underlying the performance practice, whilst the presence and relevance of the performer's body, as well as the potential broader cultural connotations of the

technologised, wired-up body, do not seem to play a noteworthy role in the conception of the work.

Underlying the work, seems a concept of technology, which I consider of relevance to a cultural analysis of the work and its sound synthesis methods. In the introduction to his essay on musical performance practice on sensor-based instruments, Tanaka claims that '[b]y itself, the computer is a *tabula rasa*, full of potential, but without any specific inherent orientation' (2000: 390). This concept of digital technology as a neutral instrument, supposedly beyond any kind of social shaping or cultural signification, then serves as the starting point for his examinations of the development of sensor-based instruments. From this perspective, it might not be very surprising that Tanaka's discussions of the hard- and software in his performance setups are largely confined to technical descriptions and a discussion of the equipment's limitations in terms of computing power: Although Tanaka's (2000) writing identifies the computer and the other digital performance hardware as a central element in his performance practice, it ignores these technologies' potential to become a trope of signification when they interact, and are brought into close contact with his body during a performance.

The notion of technology as a 'neutral' force, which enters society as a *tabula rasa*, suggests a deterministic concept of technological change, where technological innovation is considered an independent development, driven by a cause-and-effect process inherent in the technology itself. Scholars in the field of cultural studies of science have challenged this understanding of technology, arguing that technological development and social contexts have a mutual impact on each other, so that technological change does not only shape society, but society also influences the course of technological innovations (MacKenzie and Wajcman 1999; Bijker, Hughes and Pinch 1987; McNeill 2007).

Building on this concept of a mutual shaping of technology and society, feminist theorist Cynthia Cockburn presents a two-fold argument: On the one hand, she points out that technologies which have traditionally been associated with women, such as house-hold appliances, have usually simply not been acknowledged as technology-proper, thus forging the belief that engagement with technology is historically a typically masculine domain (1999a). On the other hand, she argues that, because technology – in its historical, narrow definition - has traditionally served as 'one of the formative processes of men' (Cockburn in Mackenzie and Wajcman 1999: 25) it has

often purposefully been designed in a way that only men would have access to it. She illustrates this tendency by arguing that units of work, such as hay bales, cement sacks, but later also printing presses, could all very well have been constructed smaller so their handling would be less dependent on bodily strength. However, these units have all been designed with male physiques in mind, thus securing that women will mostly not have access to the trades concerned (Cockburn 1999b).

Although physical strength is usually an irrelevant parameter in work with digital technologies, a similar phenomenon (albeit in a more subtle fashion) seems to play a role in the outcomes of a study concerning different approaches to computer programming by Sherry Turkle and Seymour Papert (1990)[2]. They describe how the widespread concept of 'computation as the ultimate embodiment of the abstract and the formal' (1990: 128) has informed a computer programming culture in which more concrete approaches to scripting, which tend to conceptualize a program as a composition of physical entities or consider it in context of everyday life phenomena, are believed to be inherently inferior. Evaluating a number of case studies, they noticed, firstly, that many successful programmers do in practice not follow the officially preferred formalist approach, but would never admit this in public out of fear for loss of esteem, and, secondly, that significantly more women than men tend to prefer a more concrete programming approach. Although their study avoids an explicitly gendered reading of their observations, Turkle and Papert suggest that the historical dominance of men in the development of programming environments and teaching material may be an explanation for their findings. Considering the mutual impact of society and technology on each other's development, the way computers and their operating systems have developed will have been affected by the officially preferred formalist approach to programming.

Thus, computer technology is not a *tabula rasa*. On the contrary, it is a culturally inscribed practice, which should be treated as complicit in the constitution of meanings of a work of biosignal performance. Biosignal performance based on a traditional 'musical instrument' approach, which considers technology as a neutral force, is

[2] Turkle and Papert's research was performed around 1990 and although the principles of computer programming they describe have largely remained the same, their article could be considered somewhat dated if we take into account the enormous developments in computing technologies that have taken place since its publication. However, I refer to their research, rather than more recent publications on the topic (e.g. Ensmenger 2010), because in the 1990s computer programming was taught to a wide range of students in a variety of disciplines, and not only in technology-focused degrees as is common practice today. This gave Turkle and Papert the opportunity to perform the insightful empirical focus group research on which their article is based.

coherent with the assumed self-evidence of an abstract approach to programming for digital sound processing, which does not engage with possible extra-musical affordances of the sound and its technologies. Turkle and Papert's research suggests that this attitude is not necessarily the result of a merely aesthetic decision. Rather, the denial of a work's technological artefacts' gender-political relevance which is inherent in a formalist approach to sound programming and sensor technology, may be read as part of a gender-normative paradigm where male subjects are beyond the need of gender definition[1].

Sonified biosignals and technologies of the everyday: Pamela Z. and Mona Hatoum

In her short and witty performance piece *Typewriter* (1995), Pamela Z. uses a BodySynth™ EMG sensor device, which is attached to her forearms. In the performance she narrates the text of an imaginary letter to a friend, following her speech with an 'air typewriter' performance. When she moves her fingers, samples of typewriter keys are triggered and when she makes a sweeping gesture with her arm, a carriage return and a typewriter bell can be heard. Rather than using gestural control to generate abstract sound material, Pamela Z.'s objective is clearly to create a direct (and quite literal) reference to other, non-sonic, aspects of the piece. The sound refers quite explicitly to a typewriter, which, in turn, gives meaning to the performer's gestures (they will undoubtedly be recognised as typing) and frame the recited letter in a quasi-nostalgic atmosphere (the typewriter is now an antique technology).

The connection Pamela Z. establishes between her technologized, wired-up body and the image of the typewriter as an old-school information technology, can also be read as a more serious attempt to engage with the situation of her visceral body interacting with digital technology. Notably, typewriting has historically often been associated with women (Hartman Strom 1994). Considering this, Z.'s approach may also be read as a departure from futuristic fantasies of hard bodies and transcendent technology. In his book *Gramophone, Film, Typewriter* (1986), Friedrich Kittler suggests that the emergence of women as typewriters in the early 20th century played a prominent role in breaking down the pre-industrial polarity where women's productive role was seen in generating products of craft, whilst writing was considered the

[1] This echoes Georg Essl's (2003) critique of the majority of male music performance practices with new interface technologies, in which he refers to Judith Butler's (1990) discussion of Luce Irigaray and Simone de Beauvoir concerning this notion.

exclusive domain of men to disseminate their thought[2]. The popularity of a 1950s television sketch by American comedian Jerry Lewis, in which he stereotypically mocks the performance of femininity and the monotony of the work of typewriters (igvmyslf1000pts 2006), further illustrates the role of the typewriter (both the technology and the person) in the public perception of gender roles. Taking this into account, Z.'s connection of biosensor technology with typewriting, may also be seen as a subtle reminder that the common view of engagement with technology as an historically male activity is, as Cynthia Cockburn (1999a) suggests, forged by an exclusion of technologies commonly used by women in patriarchal societies from the realm of technology-proper.

The use of biosignal sonification to thematize technologies' cultural aspects, which, arguably, is manifest in Pamela Z.'s *Typewriter*, also plays a prominent role in Palestinian-British artist Mona Hatoum's video installation *Corps Étranger* (1994) (rachwelle 2009). Mona Hatoum became known in the 1980s for her politically motivated performance work. She grew up in a Palestinian refugee camp in Lebanon and went into exile in the United Kingdom when the Lebanese civil war broke out in 1975. In her work, she has explored the experience of being 'exiled' from a physical, emotional and cultural perspective through a corporeal approach (Brett 2005). In her performance *Under Siege* (1982), she enclosed herself in a glass container covered with clay, in which she attempted to stand up for a period of 7 hours whilst loudspeakers were playing fragments of news reports and propaganda related to the political situation in the Middle East. Hatoum's video installation *Measures of Distance* (1988) takes her relationship with her mother as a starting point to explore the emotional and physical experiences of living in exile. The video shows letters written by her mother and images of her mother's naked body in the shower, whilst fragments of conversations between Hatoum and her mother and English translations of the letters can be heard. The letters and conversations address the physical and emotional distantiation between Hatoum and her mother, as well as their shared experiences of being a woman in Palestinian culture (Brett 2005).

The installation *Corps Étranger* can be seen as a further exploration in Hatoum's engagement with physical and psychological aspects of belonging, and her experiences of a diasporic existence. The core of *Corps Étranger* consists of video and sound

[2] Although of course most women typewriters were still merely transcribing male thoughts as secretaries or copyists.

recordings the artist made of the in- and outside of her own body: Inside a white cylindrical booth, which can be entered by spectators, video footage from a medical endoscopic camera is projected on the floor. Upon entering the space, spectators are confronted by a confusing sequence of short fragments of extreme close-up investigations of parts of Hatoum's body: a nostril, the stomach, the vagina, an eyeball, the anus. At the same time, sound recordings of Hatoum breathing (extremely close-miked) and a Doppler sensor registering blood flow are played through loudspeakers which are installed at ear-height inside the booth.

In her discussion of the use of video in *Corps Étranger*, art historian Ewa Layer-Burcharth (1997) suggests that the unsettling experience of foreignness of Hatoum's body in the installation is evoked by what she calls the 'exclusionary logic of three gazes' (1997: 199). These are manifested in the simultaneous occurrence of three different viewing experiences: The video material's apparent focus on bodily orifices and genitals and the peepshow-like setting of the presentation booth the video is shown in, might make the setting somewhat reminiscent of a pornographic scenario. Yet, this perception is undercut by the clinical scrutiny and extreme close-up of the images, as well as the anatomical lesson-like horizontal projection of the video on the floor. This clinical perspective, in turn, is troubled by the aesthetisized format of presentation, as well as the apparent lack of medical purpose of the video footage.

Echoing the 'clinical perspective' of some aspects of the video material, the methods of body sonification chosen by Hatoum refer to a medical surveillance situation: To anybody who has been subjected to a thorough medical check-up (or, for that matter, people who are familiar with medical reality shows on television), the sound will easily be recognised as originating from diagnostic equipment. Notably, the sound of the Doppler flow sensor is commonly associated with pre-natal consultations in particular[3]. The recognizability of this sound marks a difference with the video material, which also signifies medical observation equipment, but will - because of its associations with rather rigorous medical observation practices - arguably not easily evoke a familiar experience and is also less specific in its reference to the practice of exercising power over *female* bodies through medical surveillance. The specific relevance of Doppler ultrasound technology in this context is pointed out by Canadian anthropologist Lisa M. Mitchell (2001). She shows how the representation of foetuses

[3] After one of my own performances in which I used a Doppler heart scanner on my body, a friend who recently became a mother described the performance as 'a man trying to give birth'.

with this technology has played a significant role in the growing acceptance of a concept of the foetus as a subject *inside* the mother, instead of a part of the mother's body. This concept of the foetal subject has become relevant in anti-abortion discourses that plea for recognition of the rights of this subject and consequently demand state-enforced restrictions of the mother's control over her own body.

Considering this, Hatoum's sonic references to medical observation equipment can be read as a further amplification of the 'foreignness' of her body, that, arguably, shows that this foreignness does not only concern her experience of not fully belonging to either Palestinian or British society, but also the estrangement from her own body. This estrangement is not – as the video material of the work might suggest - exclusively established through rigorous medical practices of physical body invasion, which are normally only applied to seriously ill people, but also through everyday, and commonly considered innocent, diagnostic routines.

Queering the hard body: Soft feedback and intimate electrodes

My performance works *Feedback* (2010) and *ELECTRODE* (2011) focus on interactions between my body and commercially available technological devices. Unlike Stelarc's apparent interest in performative explorations of possible future forms of human bodies connected to technology, I am primarily interested in the role of technological devices in conjunction with bodies in everyday culture. Taking my white, male body as my conceptual ground (whenever I perform with my body, it will be with this white, male body), my approach in these works is aimed at establishing a juxtaposition of, on one hand, performance methods which afford associations with a Futurist or otherwise male-normative technological paradigm (as I suggested in my analyses of Stelarc's and Tanaka's work) and, on the other hand, a play with references to technologies usually considered outside the realm of – to echo Cynthia Cockburn – male formative experience (in accordance with my readings of Pamela Z. and Hatoum's work). Thus, in *Feedback* and *ELECTRODE,* I seek to queer commonplace assumptions concerning the way in which my male body ought to 'naturally' interact with technological artefacts.

My performance installation *Feedback*[4] is set up in two spaces. I am standing in the first space, whilst a video monitor and a suspended loudspeaker are installed in the

[4] For a full description of the technical specifications and setup of *Feedback,* see appendix III.

second space. In addition, the packaging material and parts of a case of an *AngelSounds* Fetal Doppler sensor are exhibited on a pedestal in the second room. The *AngelSounds* Fetal Heart Detector is a cheap, mass-produced consumer device produced by the Chinese medical electronics manufacturer Jumper Medical. The smoothly designed pink and white unit, packed in a matching pink box, is marketed as a home-use device for pregnant women to listen to a sonification of their unborn baby's heartbeat.

Figure 3.1. *AngelSounds* Fetal Heart Detector box

The modified sensor, installed in a transparent box so the pink volume control wheel of the device is conspicuous, is strapped to my chest with an elastic band with bra closures. A prepared loudspeaker is attached to my back. The sensor registers the movements of my heart and converts this data into an audio signal. This signal is sent to the loudspeaker on my back. However, the loudspeaker's cone has been removed and the signal is sent through an extreme low-pass filter, which removes high frequencies from the signal. Normally, a loudspeaker generates sound because it causes the air around it to vibrate by means of moving the surface of the cone. If the cone is removed, the loudspeaker does not move enough air to generate sounds in the lower frequency range. If the audio signal is additionally sent through a low-pass filter, the speaker will merely follow the movements of the lower frequencies of the signal without emitting an audible audio signal. Thus, the coil of the loudspeaker mechanically replicates the movements of the contours of the signal from the heart sensor. Metal pins have been attached to the loudspeaker coil and prod the skin of my back. Thus, a representation of the movements of my heart is played back on the outside of my body and creates what we might call a haptic feedback loop. The only sound coming from the speaker is the mechanical clicking of the metal parts of the speaker's interior slamming together because of the high amplification of the signal.

Figure 3.2. ***Feedback*** **(2010), first space**

In the second space, which is larger than the first, the video monitor shows a real-time close-up of the part of my back where the metal pins touch the skin. Next to the monitor, an unmodified loudspeaker (the same type as the prepared loudspeaker attached to my body) is suspended from the ceiling. This loudspeaker emits the unfiltered signal of the Doppler sensor in the first space and therefore generates an audible signal. The visually perceived movements of the prepared loudspeaker displayed on the monitor and those of the sounding loudspeaker suspended from the ceiling are practically identical. During a performance, spectators can move freely between the two spaces.

Figure 3.3. ***Feedback*** **(2010), second space**

In the first space, only the persistent mechanical clicking of the pins connected to the modified loudspeaker is clearly audible. I am standing in an upright, static position throughout the performance, seemingly unmoved by the prodding of my back by the metal pins. In this space the work seeks to evoke the impression of a 'hard body', as discussed in Klaus Theweleit's *Male Fantasies*. I then attempt to undermine this apparent macho scenario in the first room by the sound in the second space. The unmodified amplification of the sound of the heart monitor in this space sounds similar to the Doppler sound in Hatoum's *Corps Étranger*. Taking my cue from my reading of Hatoum's use of this biosignal sonification method as a reference to the medical practice of surveillance of female bodies, the *AngelSounds* Doppler sensor was used for its obvious non-masculine connotations (not only sonically, but also visually by means of the pink-and-white Barbie appearance of the casing and the packaging material). Thus, whilst moving between the two spaces, visitors experience a juxtaposition of two related approaches to biosignal sonification. The first seeks to facilitate, whilst the second seeks to undermine a reading of the work in terms of normative gender performance in conjunction with digital technology.

Whereas the sound in *Feedback* is generated using the signal of a fetal Doppler sensor, *ELECTRODE*[5] features a commonly used medical commodity to monitor and treat problems related to a malfunctioning sphincter muscle. The *Anuform*® anal electrode and the *Peritone* EMG sensor are produced in China for the British brand *NEEN*[6], which specializes in home-use medical technologies for the treatment of incontinence problems. The *Anuform*® anal electrode in combination with the *Peritone* EMG sensor are intended to monitor exercises that seek to strengthen the sphincter muscle of people who are experiencing weak muscle response, which manifests itself in faecal incontinence. In the exercises, the user performs sequences of voluntary sphincter muscle contractions at regular intervals, whilst the sensor device gives biofeedback by displaying the electric potential generated by the muscle. By means of keeping record of achievements registered during different practice sessions over time, the user seeks to improve performance. Alternatively, the *Anuform*® electrode can be used in combination with a *Pericalm* unit. This is a muscle stimulation device that sends out electrical impulses that cause the sphincter muscle to contract and thus helps it regaining strength. The use of EMG biofeedback for the treatment of faecal

[5] A full description of the technical details and setup of *ELECTRODE* can be found in appendix IV.
[6] *NEEN* is a brand of Patterson Medical Ltd.

incontinence was first described in the 1970s (Engel, Nikoomanesh and Schuster 1974), but sensor technology for home use has only become affordable for the consumer market since the mid 1990s (Heymen, et al. 1999). Previously, EMG sensors were very costly and were primarily used for medical research. Because the male orgasm is accompanied by involuntary sphincter muscle contractions, EMG sensors to register sphincter muscle activity were first used in the 1970s in research into the nature of the male orgasm (Peterson and Stener 1970).

In *ELECTRODE*, activity of my sphincter muscle is registered with an *Anuform*® anal electrode connected to a *Peritone* EMG sensor interface. The sensor has an array of LEDs on its front. When muscle activity increases, LEDs in a higher region light up. In order to lead sensor data into the Max/MSP program that generates the sound and video of the work, I constructed an optocoupler on the body of the device. An optocoupler uses light sensitive components to enable the transmission of information between two independent circuits. I attached light dependent resistors (LDRs) to each of the 20 LEDs on the front of the *Peritone* sensor. When an LED on the sensor lights up, the resistance of the LDR attached to it drops. The resistance of the individual LDRs is registered by an Arduino-based interface that subsequently sends its data to the Max/MSP program. The EMG data registered by the *Peritone* sensor could also have been captured by removing the body of the device and connecting the sensor circuit directly to the Arduino interface. However, I deliberately chose the optocoupling method in order to leave the body of the device intact and make sure it would still be recognizable as a commodity.

Figure 3.4. *Anuform*® anal electrode

In the performance, a graph of the sphincter contractions of an anonymous subject in a 1980s medical research project into the male orgasm is projected onto the wall I am facing. In this research project, which took place at the University of Minnesota, male subjects were asked to masturbate to orgasm whilst their sphincter muscle activity was registered with an anal probe (Bohlen, Held and Sanderson 1980). A second graph, representing the real-time contractions of my sphincter muscle during the performance, is projected below the first graph. Through voluntary contraction of my sphincter muscle, I try to imitate the contraction pattern of the top graph as closely as possible. Thus, my performance may afford associations with the notion of 'faking' an orgasm.

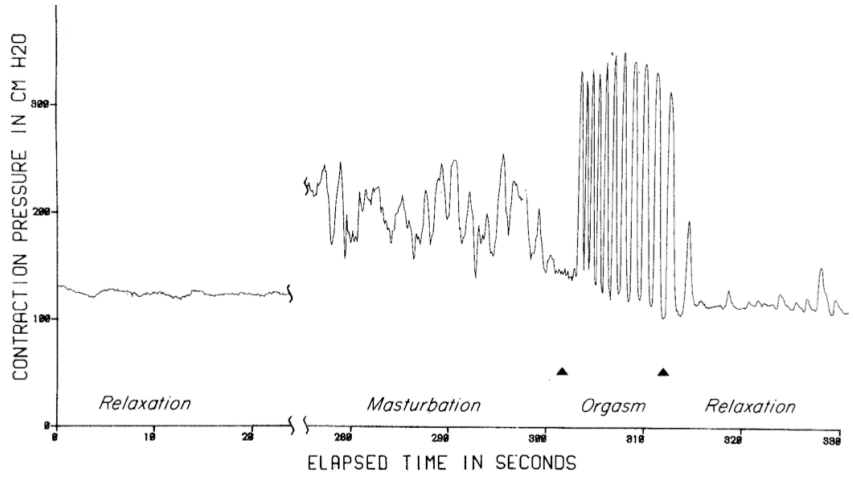

Figure 3.5. Sphincter muscle contraction pattern registered in an experimental subject during masturbation and orgasm (Bohlen, Held and Sanderson 1980), used in *ELECTRODE*

The EMG data is used to control different parameters of the GENDY (GENeration DYnamique) sound synthesis program. This program was conceived by French-Greek composer Iannis Xenakis (1992) and realized in programming language BASIC by Marie-Helene Serra in the early 1990s. GENDY is an implementation of Xenakis' stochastic dynamic synthesis method, which he developed from the 1950's (Luque 2009; see appendix I).

The GENDY program used in *ELECTRODE* is an adaptation for Max/MSP of computer musician and researcher Nicholas Collins' realization of Xenakis' GENDY1 for programming language Super Collider. The Max/MSP program running *ELECTRODE* has seven different basic settings, each of which uses the EMG data to control different parameters of the GENDY algorithm and therefore generates different sound textures. Each time the performance of the pattern projected onto the screen is

repeated, the program randomly selects one of these seven settings.

Throughout the performance, I am standing in the middle of the space, facing the projection screen, taking a narcissistic pose reminiscent of an Action Man doll (Figure 3.6). I am wired up to the sensor and surrounded by packaging material and direction manuals of the electrode and sensor (Figure 3.7). The audience can move around freely within the space and enter and leave as they please.

Figure 3.6. Action Man toy figure

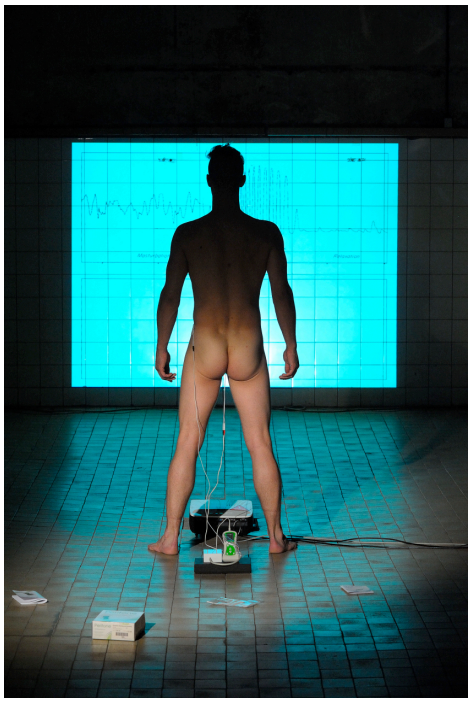

Figure 3.7. *ELECTRODE* performance in Ostrava, Czech Republic, August 2011. Photo: OCNM Archive / Martin Popelář

Similar to *Feedback,* a central objective in *ELECTRODE* is to provoke an ambiguous experience of my bodily presence in the gallery. A number of aspects of the work are aimed at evoking an experience of my body that conforms to common expectations and norms concerning the shape and behaviour of 'the' male body. These aspects are juxtaposed by references to paradigms that undermine these expectations.

Firstly, the Action Man pose of my carefully exercised body seeks to establish a stereotypical image of my body's adherence to normative Western physiques. In *Transgressive Bodies* (2010), Richardson argues that the lean muscular bodies featured in popular magazines such as *Men's Health* currently are the beauty norm for male physiques. The body of the Action Man toy figure very much resembles this physique. Secondly, the repetitiveness of the attempts to reproduce one single graph from Bohlen's research as carefully as possible with my voluntary sphincter contractions is motivated by a desire to represent the sexual references of the work in a performance and skill focused context, which is commonly associated with masculine perspectives on sexuality. In a research project on perceptions and experiences of heterosexual intercourse of both men and women, psychologists Roberts et al. (1995) found that most men in their research focus groups approached sexuality as a matter of 'technique and work' (1995: 525), where a 'good' sexual partner is defined by his ability to employ his physical skills to bring the female partner to orgasm. Thirdly, when considered in the context of widespread practices of biosignal performance, such as the work of Stelarc and Tanaka discussed earlier in this chapter, I suggest that the abstract sound texture generated by Xenakis' GENDY program can be read as an archetypical biosignal performance sound. The GENDY program was a seminal development in electronic sound synthesis methods and the sound it generates will hardly ever be perceived as concrete (in the sense of Pierre Schaeffer's (1952) concept of concrete sounds). Thus, both in its computational implementation and sonic outcomes, it conforms to the abstract, formalist approach that Turkle and Papert identify as closely associated with masculine computer programming paradigms.

These three aspects that will mostly afford associations with normative masculine representations of my body, are complicated by references to paradigms that are outside the realm of commonly acceptable masculine performance. The use of an anal electrode is very conspicuous in a performance context and in *ELECTRODE* it is envisaged to heighten the perception of the performance technology as a relevant element in the affordance of meaning in the work, rather than merely a means to

'channel' the performer's 'expression' as Tanaka would have it. Furthermore, the electrode complicates the masculine framework described above through its references to anal penetration and faecal incontinence, both of which are tropes of fear in heteronormative masculinity. Medical research has shown that many men refuse to undergo digital rectal exams and colonoscopies, which involve the insertion of the physician's finger or an endoscopic camera in the anus, because they associate 'any penetration as an affront to their masculinity' (Winterich, et al. 2008: 300). Faecal incontinence concerns the unintentional loss of faeces from the rectum in people over 3 or 4 years old. It most frequently occurs with people over 60 years of age and children between 7 and 9 years old. In the latter case, however, incontinence is mostly caused by psychological factors, rather than malfunctioning sphincter musculature (Whitehead and Drossmann 1996). Therefore, technologies such as the *Anuform*® and *Peritone* are generally associated with age-related bodily malfunctioning and thus fall outside the frame of reference of the young and healthy '*Men's Health* body'.

Another element in the performance intended to disturb the image of hegemonic masculinity that is arguably set up by the combination of my body's pose, physical skills-focused approach to sexuality and the abstract, technological sound, is the idea of 'faking' an orgasm which I seek to evoke through the act of reproducing the sphincter contractions of the experimental subject in Bohlen, Held and Sanderson's research[3]. Although suggesting a masculine, physical performance oriented approach to sexuality, the repetitive attempts to imitate the orgasm-related sphincter contraction pattern of somebody else may at the same time act as a reference to the 'faking syndrome' commonly associated with women in heterosexual intercourse. Research by sociologists Roberts et al. (1995) shows that among women, simulating orgasm is commonly perceived as an appropriate thing to do in order to prevent male partners becoming insecure about their ability to satisfy their partner. Roberts et al. suggest that the 'faking syndrome' causes fear in men because of 'its connections with poor technique which they read as a questioning of their masculinity' and touches on a 'culturally prevalent fear that women's desire is in essence unknowable and insatiable. If women are faking orgasm, it might be that masculine technique is in itself lacking' (Roberts, et al. 1995: 530). Considering this, the mechanical and pseudo-scientific orgasm simulation in

[3] Thus, this aspect of the work clearly diverts from the focus on the 'productivity' of male masturbation that underlies Vito Acconci's performance incentive to 'cover the floor with sperm' (Diacono 1975: 168) in his performance *Seedbed* (1972).

ELECTRODE, may be read as an attempt to bring this syndrome back into a masculine domain. However, the repetitive, largely unsuccessful attempts to accurately imitate the contraction pattern of the Bohlen graph combined with its reference to the (usually much more successful) female practice of faking orgasm, is also conceived as a somewhat more subtle reference to the much feared idea that 'masculine technique is in itself lacking'.

In my discussion of Atau Tanaka's work I suggested that the visual appearance of biosignal performance practices tends to draw the spectators' attention towards the performer's body. Rather than trying to downplay this aspect, *ELECTRODE* is aimed at further heightening the presence of my body and its interaction with the technology connected to it. Thus, in addition to its concern with specific aspects of the performance of masculinity in relation to the body and sexuality, the work seeks to draw attention to the fact that performance technology and biosignal sonification methods are not to be approached from the perspective of a *tabula rasa* that can be shaped at will to serve musical aesthetic interests. Rather, these aspects are always complicit in broader cultural associations and meanings of the work.

CHAPTER FOUR
THE DIGITAL DOUBLE AND THE GROTESQUE

In the previous chapter, I proposed an approach to biosignal performance that takes into consideration the potential broader cultural affordances of the sound and the technologies in the work and which juxtaposes references to different cultural paradigms to establish an ambiguous representation of the performer's body. In this chapter, I explore this strategy in the context of British theatre maker and scholar Steve Dixon's (2007) concept of the 'digital double' in conjunction with Russian literary scholar Mikhail Bakhtin's (1984) notion of the grotesque body.

Drawing from an examination of digital doubling in my work *Feedback*, I argue that digital doubles are not always as clearly identifiable as separate entities as the examples of primarily visual work in Dixon's writing suggests. I suggest that the character of a digital double may range from a clearly distinguishable entity akin to the double in Lacan's mirror-stage (as is the case in Dixon's examples), all the way to an unsettling experience reminiscent of the fragmented body (in *Feedback*), which has been discussed by psychoanalyst Jacques Lacan, as well as art historians and anthropologists.

I propose that the fragmented body representations in *Feedback* can also be perceived along the lines of Bakhtin's concept of the grotesque body. Bakhtin shows how grotesque representations challenge the body's wholeness by permeating its boundaries with substances and body parts from the body's inside (sweat, faeces, urine, blood) and a focus on the lower stratum of the body. These characteristics apply to a number of aspects of my works *Feedback* and *ELECTRODE*, which I discussed in chapter three, as well as performances which form part of my project *SUIT*, which I introduce in this chapter. Drawing from my examinations of these works, I seek to demonstrate how a heightening of the grotesqueness of certain aspects of a sonified body can be an effective strategy in the conception, as well as the media representation of biosignal performance work.

Challenging the digital double

In digital performance, video and sound technologies are frequently used to establish simultaneous presences of performers and their non-material counterparts. From the early explorations of closed circuit television by artists such as Dan Graham and Bruce Nauman to the advanced digital sound and video synthesis by contemporary groups like Blast Theory and the Chameleons Group, the use of technological means to multiply performers' presence has been an important strategy to thematize issues of the subject's embodiment and consciousness.

The combination of 'live' and 'mediated' presence in performance has been discussed by theorists such as Philip Auslander and Steve Dixon. Whilst Auslander (2008) examines the tension between the 'live' and the 'mediated' presence of performers, and argues how this opposition tends to contract in people's perception in present day's mediatized culture, Dixon (2007) suggests that, in digital performance, a simultaneously present 'mediated' performer may be considered as a 'digital double'.

In his book *Digital Performance* (2007), Dixon identifies Artaud's *The Theatre and its Double* as the primary cue for his concept of the digital double and describes Artaud's notion of the double as 'theatre's true and magical self' (2007: 241). In a letter to his publisher, Artaud concisely, and in a somewhat mysterious manner, described the concept of the theatre's double as 'reality untouched by the men of today' (1989: 87-8). Possibly giving a bit more insight into his understanding of the concept, Artaud's call for a 'Theatre of Cruelty' proposes a cruel, violent attitude to performance. Not in a literal, physical sense, but in an endeavour to confront audiences with uncomfortable realities of life (theatre's double) and remind them of the fact that '[w]e are not free. And the sky can still fall on our heads' (1958: 79).

Since the publication of *The Theatre and its Double*, a number of theorists have debated how Artaud's concept of theatre as 'real life' may be understood. Jacques Derrida (1978) has argued that Artaud's project to stage a 'pure presence' is doomed to fail since theatre (and language) will always be part of a system of representation. Likewise, performance theoretician Herbert Blau (1990) points out that the fact that performance is always framed (if not spatially, then at least temporally) makes Artaud's objective impossible. Dixon's discussion, however, is not directly concerned with a critical engagement with Artaud's concept of the

double. Rather, it uses the concept in reference to cyberculture discourses around digital representations of the body, which he poetically describes as 'romantic utopianism hailing spiritualized virtual realities […] pitted against a dystopian skepticism' (2007: 241).

As a second point of reference, Dixon draws parallels between the 'digital double' and Lacan's illusory image of the subject's double, which is perceived in the mirror stage, as well as Freud's notion of the uncanny. I start this chapter with an exploration of Dixon's concept of the digital double in the context of my performance installation *Feedback,* which I introduced in chapter three.

Dixon distinguishes four types of digital doubles, whilst acknowledging that the boundaries between these categories are not necessarily fixed. In performance or installation work where the image of the beholder plays an active role in a digital environment, or where it is used as a (technological) mirror, the double is considered as a 'reflection'. As an example of such work, Dixon describes Dan Graham's *Present Continuous Past* (1974), where the spectator is confronted with delayed video recordings of herself inside a cube lined with mirrors. Another example is Blast Theory's *10 Backwards* (1999), in which the main character Niki attempts to exactly reflect and copy the actions of a video recording of herself.

In the second category, the double functions as the performer's 'alter-ego'. Most prominent example here is Chameleons Group's *Chameleons 4: the Doors of Serenity* (2002), in which Dixon himself plays the role of a cyborg who has a discussion with two digital *Doppelgängers*, both having distinct personalities.

Digital doubles that are depicted as more fluid shapes, often composed of clearly distinguishable particles, are defined as doubles that function as a 'spiritual emanation'. This kind of digital double occurs in Igloo's *Viking Shoppers* (2000), where live video recordings of the performers are converted into body-like shapes composed of computer characters. Also, Dixon identifies the somewhat magical floating in space of the projected video recordings of the performers in Troika Ranch's *The Chemical Wedding of Christian Rosenkreuz* (2001) as digital doubles that function as spiritual emanations.

The fourth category - the digital double as 'manipulable mannequin' - concerns computer generated avatars that act as a double of a 'live' performer. Such computer controlled mannequins have been used in theatre productions such as David Saltz's interpretation of Shakespeare's Tempest, *Tempest 2000* (2000). In this

production, Ariel is played by a performer who is locked up in a cage on stage. The movements of this performer are registered by means of a movement tracking suit on her body and subsequently used to control the movements of a computer generated image of Ariel. In the same category, Dixon also mentions Stelarc's *Prosthetic Head* (2002-), which is a virtually intelligent computer graphics simulation of the artist's head that speaks in response to questions typed by exhibition visitors.

A detailed discussion of this categorization and the accompanying examples would be beyond the scope of this chapter. However, what is of relevance for the discussion here, is the fact that, in all of the examples Dixon discusses, the double can be clearly distinguished as separate from the performer's body: there never seems to be any confusion concerning the place of the boundaries between 'live' presence and mediated presence. If read in conjunction with Auslander's notion of 'liveness', the concept of the digital double may be a useful contribution to the liveness debate: Whereas Auslander is primarily concerned with an investigation of 'live performance's cultural valence' (2008: 2), Dixon's considerations clearly engage with the conceptual substance of this phenomenon within specific performance contexts. However, considering the obvious parallel between Dixon's digital double and Auslander's mediated presence, the fact that all doubles discussed in Dixon's examples are clearly identifiable as separate from the performer's body is somewhat surprising.

Drawing from Baudrillard's (1983) concept of the contracting poles of reality and simulation in contemporary mediatized society, Auslander argues that the formerly distinct poles of the 'live' and the 'mediated' are blurring in contemporary culture so that a live performance may now at times function as a copy of a mediated spectacle. Accordingly, one would expect the clear-cut distinction between the 'real' performer and her/his digital double, which is suggested by Dixon's examples, not to be so self-evident. Indeed, work can be imagined in which the distinction between the performer and her/his double is at times ambiguous, or where the difference between 'real' and double relies on the audience's perspective rather than an intrinsic aspect of a performance setup. Here, one could think of video artist Gary Hill's *I Believe it is an Image in the Light of the Other* (1991-92), in which close-ups of different parts of the artist's body are projected onto books scattered around the floor. In clear opposition to a reading based on a concept of a unified double, art historian Ewa Lajer-Burcharth has argued that the fragmented representation of the

body in this work foregrounds 'the problem of spatial and psychic interruption' and that the 'fragmentary and fragmenting space represents a subject whose fond narcissistic illusions of wholeness have been dispersed' (1997: 187).

Another noteworthy aspect of Dixon's examples is that, despite his claim that 'the digital double projects itself online and on stage to take numerous forms' (2007: 242), his examples are all focused on visual representations. However, the body can also be represented with non-visual media. In Stelarc's *Amplfied Body* (1970-1994), for example, the artist's body is represented sonically.

In the following, I concentrate on a closer examination of the concept of the digital double in the context of work that combines multiple aural and visual strategies of digital doubling and attempts to complicate the identification of one singular digital double. This examination is focused on my performance installation *Feedback* (2010), which features a combination of visual, sonic and haptic representations of my body.

As I described in chapter three, *Feedback* is set up in two spaces. I am standing in the first space with the Doppler flow sensor and the prepared loudspeaker attached to my body. In the second space, the video monitor shows a real-time transmission of the part of my back where the metal pins prod my skin and the loudspeaker plays the signal generated by the Doppler sensor on my body.

If we read this setup in accordance with Dixon's theory of the digital double, we could say that the loudspeaker and video in the second space constitute a digital double of my 'live' body with the prepared loudspeaker in the first space. However, the movement of the pins of the prepared speaker on my back could also be regarded as a double of my heart. In addition, if we consider that these doubles may, in turn, be doubled themselves, the constellation becomes even more complicated: The loudspeaker in the second space, which produces sound but also moves according to the sound signal in a visually perceptible manner, could be regarded as a double of the moving pins on the video in the same space, or vice versa…

The perception of these 'body'-'double' constellations changes particularly whilst the beholder moves through the installation. Whilst watching the video and the loudspeaker in the second space, without having been in the first space yet, the video might be perceived as a double of the loudspeaker. On the other hand, whilst in the first space, a beholder who is aware of the process of the Doppler heart-sensor might at first perceive the pins of the prepared speaker as my body's double. Later

on, after moving between the two spaces, the video and loudspeaker in the second space might together be experienced as a double of my visceral body with the prepared speaker in the first space.

Thus, the possibility of multiple readings of this setup unbalances the distinctions between the 'body' and its 'double', which seemed well secured in Dixon's examples. In response to this, one might argue that the presence of my 'live' body (in its unfragmented condition) in the work may always be perceived as source and referent of the 'whole' body. However, I do not intend to suggest here that the incoherent representation established by the simultaneous occurrence of different doubles of parts of my body effaces all possibilities to perceive my body in the work as whole and unified. Rather, I suggest that the fragmented nature of the constellation of doubles in *Feedback* may somewhat complicate the self-evidence of the perceived 'wholeness' of my 'live' body.

If the oppositions between performer and its double are not fixed and multiple constellations of these oppositions may be perceived simultaneously in *Feedback*, what might this suggest concerning the notion of the 'digital double'? As I mentioned in the beginning of this chapter, Dixon draws attention to the correlation between the concept of the body and its double in digital performance and Lacan's notion of the imagined perception of a whole body in the mirror stage. In the passage where he discusses the mirror stage, Dixon also mentions Lacan's fragmented body. He continues to link the fragmented body to Freud's uncanny and subsequently elaborates on the uncanniness Freud ascribes to the 'robotic double' of Olympia in E.T.A. Hoffmann's short story *The Sandman* (1816). Dixon does not elaborate on how the notion of the fragmented body relates to the suggested 'wholeness' of the digital double and unfortunately he also does not refer to the fragmented body again in his discussion of examples of 'digital doubling'. In the following section of this chapter, I consider the representations of (parts of) my body in *Feedback* from the perspective of theorizations of the fragmented body by Jacques Lacan, as well as two more contemporary theorists in the field of anthropology and art history, in order to further inquire the simultaneous occurrence of multiple and fragmented digital representations in digital performance work such as *Feedback*.

Lacan (1949) argues that from the mirror-stage, which a baby enters when it is 6-18 months old, the image of the body's double in the mirror functions as a trigger for an 'orthopaedic' illusion of a unified body. This illusion compensates for

the loss of the sense of original unity (primarily with the mother), which used to be experienced earlier, in the phase of the Real. After the mirror-stage, Lacan writes, a fear of the fragmented body may return in dreams with 'disjointed limbs, or of those organs in exoscopy, growing wings and taking up arms for intestinal persecutions' (1949: 4), thus challenging a subject's image of the unified body. Lacan points out that the dream images of a fragmented body occur in a very accurate manner in the paintings of Hieronymus Bosch, thus suggesting that art may also function as a manifestation of the fear of the fragmented body. Several aspects of *Feedback* show a significant resemblance with the dream images Lacan describes: Both the pins on my back mimicking my heart movements and the loudspeaker suspended from the ceiling which emits the sound of the Doppler heart sensor could be perceived as what Lacan calls 'organs in exoscopy'; (pseudo-)medical observations of organs outside the body. Furthermore, the video transmission of only part of my body (my back) in a separate room could be regarded as a technological version of Lacan's 'disjointed limbs'.

Figure 4.1. Hieronymus Bosch – *The Garden of Earthly Delights* (probably late 15th Century; fragment)

Figure 4.2. Workshop Hieronymus Bosch – *Hell* (early 16th Century; fragment)

More recently, anthropologists and cultural theorists have considered the notion of the fragmented body in the context of consumer culture and in relation to artistic engagement with cultural stereotypes. Anthropologist Lesley Sharp (2000), for example, argues that the omnipresence of images of partially organic, partially mechanical cyborg bodies in media representations, as well as medico-scientific developments that facilitate organ transplantation and the substitution or addition of (organic or mechanical) body parts, contribute to an increasing commodification of the human body; human bodies are increasingly perceived as fragmented entities, the individual parts of which can be traded and thus represent a certain exchange value. This commodification of the fragmented body also facilitates state imposed limitations on the 'rights of control and ownership of one's own body' (2000: 290). This latter possibility is echoed in Lisa Mitchell's (2001) analysis of the politics of ultrasound technologies used for the observation of foetuses. As I pointed out in the previous chapter, Mitchell examines how the perception of the foetus as separate from the mother's body, which is facilitated by this technology, is instrumentalized by abortion opponents in their call for legal restrictions on women's control over their body during pregnancy.

Taking a different perspective, art historian Linda Nochlin (1994) considers the role of the fragmented body in artistic contexts and observes that the representation of body parts in visual art since early Modernity has occurred in a range of different roles. In Henry Fusili's painting *The Artist Overwhelmed by the Grandeur of Antique Ruins* (1778-79), for example, the giant foot and hand of an

antique statue positioned next to a tiny (in comparison) contemporary person arguably present the fragmented body as a metaphor for a sense of 'loss of the whole', of the grandeur and totality inherent in Modern perceptions of antiquity (1994: 8). In artwork produced in the wake of the French revolution, on the other hand, body fragments more often symbolize progress or liberation. This is apparent in the representations of decapitated bodies and severed heads, such as Pierre-Étienne Lesueur's *Execution of Louis XIV* (1793), which celebrate the common people's victory over the ruling elites. Yet another role for the fragmentation of the body can be observed in Manet's and Degas' paintings of 19th century public events, such as Manet's *Masked Ball at the Opera* (1873) and Degas' *Cabaret* (1876). Here, the cut-off bodies at the edges of the canvas give the works a sense of realistic contingency in accordance with poet and theorist Mallarmé's call for a 'view I would see if I framed my eyes with my hand at any given moment' (Mallarmé in Nochlin 1994: 37), whilst paradoxically also drawing attention to the edges of the painting and thus to the 'objectness' of the painting as medium.

Nochlin also examines fragmented bodies in more contemporary work by artists such as Cindy Sherman and Louise Bourgeois. She suggests that in this work

> the part-object serves as the subverter of modernist rationality and formalist abstraction and as the site of a triumphant reintroduction of the abject in the form of an infantile desire and gender-bending metamorphosis (1994: 54)

This is apparent in Cindy Sherman's photograph *Untitled #250* (1992), which is part of the series *Sex Pictures* (1992). To construct the 'model' for this photo, Sherman combined different parts of medical anatomical mannequins to create a body with the face of an old woman, a pregnant stomach and a vagina giving birth to what looks like a string of huge sausages.

At gallery presentations of *Feedback*, several audience members suggested that they found the work uncanny and could not bear to spend more than a few minutes inside. Surely, this experience may to a certain extent be traced back to the perception of my skin being prodded with metal pins and the intimate sensation of listening to a sound that obviously originates from the inside of my body (cf. my discussion of non-speech sounds originating from the body in chapter two). However, taking my cue from the examination above, I suggest that the uncanniness of the work may also partially lie in the multiple and fragmented digital representations of parts of my body, which the beholder encounters in the work. The

virtual manifestations of disjointed limbs and external organs may well manifest themselves in a Lacanian fear of the fragmented body. Likewise, the discomfort may be a reflection of an experience of the 'subversion of modernist rationality' (Nochlin 1994: 54) - a destabilization of the comforting image of the rationally defined whole and closed body - which Nochlin sees in fragmented body representations in postmodern artwork. Or the confrontation with the fragmentability of the human body might trigger a fear of loss of ownership over the perceiver's own body in accordance with Lesley Sharp's theory of the commodification of the body and its potential consequences for people's authority over their own bodies in society.

However, these exclusively fear-focused readings of *Feedback* do not correspond with the response of *all* people with whom I talked about their experience of the work. In contrast to those who found *Feedback* uncanny, there were spectators who considered the work funny and entertaining. Referring to *Feedback* and the other artwork I developed for the research project presented in this thesis, American artist and scholar Vagner Whitehead suggests that there is 'an implied or underlying layer of humor in [my] work, mostly engendered by the discomfort some of [the] performances cause' (Whitehead 2011: n.p.). Apparently, there is a certain tension between the uncanny and the humorous in the perception of the work.

The fragmented body as grotesque body

What might be the reason for this apparent ambivalence of audience responses to *Feedback*, which fluctuate between laughter and discomfort? A possible explanation might be found in Russian literary scholar Mikhail Bakhtin's (1984 [1965]) concept of the grotesque body, which suggests the symbiosis of the hilarious and the horrific in representations of bodies with features that transgress the confines of the 'whole' body's boundaries. In his study of the representation of bodies in renaissance author François Rabelais' writing, Bakhtin suggests that grotesque images of the body are characterized by a focus on the nose, the mouth, bulging eyes, genitals and anus: 'all that seeks to go out beyond the body's confines' (1984: 316). Thus, the grotesque image goes against the concept of the whole, securely contained body, which has been favoured in representations of the classical era and after. Bakhtin stresses that the excesses in grotesque renaissance representations of the body are not merely negative, as is the case in contemporary irony or satire. Rather, the humorous, carnivalesque mockery manifest in the features of the grotesque body seeks to

'degrade' idealistic and abstract perceptions of unified subjectivity, associated with a securely confined body.

Here, degradation is not to be understood negatively, but as an act that associates things with the lower parts of the body and thus brings them 'down to earth' (1984: 330). Both the lower body parts and the earth are places where conception can take place. Earth is the element that 'swallows up and gives birth at the same time' (1984: 21). Through its mockery and laughter, the grotesque act of 'degradation' on one hand seeks to destroy its subject, whilst on the other hand it facilitates its reconstitution because it is placed in a fearless paradigm. A figure of authority that is ridiculed in a grotesque representation is rendered less significant, but at the same time placed in a position of acceptance because she/he is no longer perceived with fear. Although the underlying interest of Bakhtin's book, which was originally written as a thesis for a Candidate of Sciences degree in the Soviet Union of the 1930s, may be directed toward a rehabilitation of the unruly proletarian body in order to challenge to the docile and neatly confined body-culture of bourgeois society, Bakhtin's concept of the grotesque as a means to 'degrade' normative body politics is also of relevance to my discussion of digital fragmentation in this chapter.

The fragmented representations of my body in *Feedback*, which I have related to psychoanalytical, anthropological and artistic perspectives on the fragmented body, can be theorized from a Bakhtinian perspective. The kinship between some manifestations of the fragmented body and Bakhtin's grotesque body is apparent in Cindy Sherman's *Untitled #250,* which Nochlin examines as an example of a fragmented representation of the body in postmodern art. The image of an old person giving birth, which Sherman establishes by combining the mannequin head of an old woman with the abdomen of a pregnant woman and a vagina from which sausages emerge, is identified by Bakhtin as a typical motive in grotesque body representations because of its almost literal representation of the process of degradation, in which the earth 'swallows up [the old, dying body] and gives birth at the same time' (1984: 21).

Likewise, linguist Shun-Liang Chao (2008) draws attention to the kinship between Lacan's fragmented body and Bakhtin's grotesque body. Chao suggests that through its act of degradation, the grotesque body 'lays bare the chaotic, turbulent nature of the *real* experience […] by peeling off the illusory *gestalt* veneer of rational unity created by […] *imaginary* projection' (2008: 96; original emphases).

Thus, Bakhtin's grotesque body is related to the experience of the realm of the 'real', associated with Lacan's fragmented body. However, in Bakhtin's concept, the image of the fragmented body is not merely a source of fear for the perceiver's own bodily fragmentation, but also constitutes an empowering fearlessness rooted in an experience of the down-to-earth materiality of *all* bodies.

Bakhtin points out that the grotesque body displays 'not only the outward but also the inner features of the body: blood, bowels, heart and other organs' (1984: 318) and thus challenges the 'closed, smooth and impenetrable surface of the body' (1984: 317). The projection of the sound of the Doppler heart sensor in the second space of *Feedback* as well as the prodding of my skin by the metal pins in the first space, does therefore not only afford an experience of the fragmented body, as I suggested above; it also corresponds to the characteristics of the grotesque described by Bakhtin. Sound associated with movement of my heart inside my body now fills up a whole space and the aggressive prodding of the skin of my back by the metal pins of the prepared loudspeaker may be experienced as an almost literally grotesque attempt to permeate my body's confines. A reading of my body and its representations in *Feedback* in the context of Bakhtin's concept of the grotesque as a satire that is both critical and humorous would explain the mixed reception of the work as both uncomfortable and funny.

In my performance installation *ELECTRODE*, which I discussed in the previous chapter, the grotesque aspects of the process of biosignal sonification are also prominent. One of the work's objectives is to critique common biosignal performance practices such as Atau Tanaka's BioMuse performances by using a sensor technology that registers the activity of musculature of the lower body and is associated with defecation, rather than fancy looking devices attached to the upper body. This technology, in turn, is placed in a sexual framework through its references to research into the male orgasm. Thus, the often serious attitude of performance with digital interfaces is 'degraded' to the lower stratum of the body, placing it in a mundane framework whilst simultaneously complicating this by entering the taboo zone of faecal incontinence.

In addition to protruding body parts, Bakhtin draws attention to the excretion of bodily fluids in grotesque representations, which challenges the containment of the body by its 'smooth and impenetrable surface' (1984: 317). Rabelais' texts feature people soaked in urine, blood and sweat. In his narration of the myth of

Phaeton, who supposedly almost burnt the earth by driving the sun chariot too close, Rabelais writes that the earth 'was so excessively heated that it broke into an enormous sweat which ran over the sea' (Rabelais in Bakhtin 1984: 330). Furthermore, Bakhtin draws attention to sweating as a feature of the grotesque in a scene from an Italian *commedia dell'arte* piece featuring a stutterer who 'loses his breath, keeping the word down his throat, sweats and gapes' (1984: 304).

The uncomfortable experience many people have when they are confronted with fluids excreted from the body's inside - arguably even more so than in the perception of bodily orifices - also touches on the notion of the abject. As I mentioned earlier, Nochlin suggests that representations of the fragmented body such as those in Cindy Sherman's *Untitled #250* may become a 'site of a triumphant reintroduction of the abject' (1994: 54) because of their tendency to desublimate the sex organs. The notion of the abject body shows similarity with Bakhtin's concept of the grotesque in that both are concerned with challenging the boundaries of the inside and outside of the body.

In a text about British performance artist Franko B.'s performances which involve cutting his body to cause bleeding, Colleen Walker defines the abject body as the place 'where the boundaries of the body are transgressed. When the internal becomes external.' (2004: n.p.); as soon as bodily fluids leave the confinement of the body, they tend to become repulsive. This is the case not only with urine and faeces, but also with blood, spittle, milk and sweat. Swiss artist Yann Marussich's uncanny work *Blue Remix* (2007) exemplifies the discomfort evoked by observing such processes of liquid excretion from a body. In the performance, the artist sits inside a glass box for a period of time during which a 'mysterious blue liquid ooze[s] as blood would, through the layers of his skin as though it was a final effect or a by-product of his body's inner processes'[1]

Julia Kristeva (1982) approaches the abject from a psychoanalytical perspective. She suggests that the boundaries crossed by the abject do not only concern the physical body, but are also relevant in the forming and questioning of sexual identity. Abjection as an oral repulsion acts as a refusal of the mother and thus facilitates a breaking of the mother-child dyad in favour of the child becoming a subject. However, Kristeva argues that the abject continues to haunt the subject throughout her or his life as a threat to the unity of the self.

[1] http://www.yannmarussich.ch/perfos.php?p=14 [accessed 30/7/2012]

The abjectness of sweat, as well as its affinity with the grotesque, are relevant aspects of the conception of my performance project *SUIT* (2009-2010). In the performances that form part of it, sound is generated using the signal of a Doppler heart monitor and humidity data based on the sweating of my body. The *SUIT* project comprises a series of performance experiments and performance and installation works with a PVC performance suit. I equipped a transparent PVC go-kart rain suit with a humidity sensor, a Doppler heart monitor and a loudspeaker[2]. When I wear the suit, I start to sweat, which causes the humidity registered by the sensor inside the suit to rise. Also, my heart rate, which is registered by the Doppler monitor, speeds up.

The data from the humidity sensor and the audio signal from the Doppler sensor are sent to a computer program written in programming language Max/MSP. When the humidity level is at or below the threshold set at the beginning of a performance (usually the humidity level inside the suit, before I put it on), the program emits the unmodified Doppler sensor signal. According to the increase in humidity, this signal is then sent through a band-pass filter that gets narrower and narrower. Simultaneously, a pitched sound composed of three sine wave signals, with the centre frequency of the band-pass filter as its fundamental, is gradually added to the sound texture. The amplitude of this pitched sound follows the amplitude of the Doppler sensor's signal. Thus, throughout a performance the sound texture gradually transforms from the complex unmodulated signal of the Doppler sensor to a pitched sound composed of three sine waves that follow the amplitude of the Doppler flow signal. This progression from a 'noisy' to a 'clean' sonic texture was chosen to establish a juxtaposition between the sound and the gradual exhaustion of my body throughout a performance; whilst the sound becomes increasingly 'clean', my body becomes more and more 'noisy' in terms of excretion of sweat and a decrease in physical control. The amplified sound can subsequently be sent to the loudspeaker in the suit or to other sound sources in the performance space.

Both the treatment of my body and the biosignal sonification in the *SUIT* performances touch on the notions of the grotesque and the abject. In the beginning of a performance, the generated sound is similar to that in *Feedback*; my heart's movements are sonified outside the confines of my body. When the performance progresses I start to sweat excessively. The perception of the sweatiness of my body

[2] For a technical description of the *SUIT* project, see II.

is heightened by the wet PVC of the overall, which sticks to my body. Thus, in the beginning of the performance the grotesque aspect of the work is in the sonic realm. When the performance progresses and my sweating becomes more conspicuous, the grotesque becomes a visible feature, whilst the sound transforms toward a more abstract texture.

How could these readings of *Feedback*, *ELECTRODE* and *SUIT* from a Bakhtinian perspective be of use in the development of a critical approach to body sonification? Or, more specifically, how might the concept of the grotesque sonified body be related to the strategy of sonic enfreakment, which I introduced as the framework of this thesis in chapter two? The first aspect of interest here is that an incorporation of the grotesque can degrade the process of body technologization from the paradigm of abstract sounds and technological idealism - which I discussed in my analyses of Stelarc's and Tanaka's work - to the realm of ridicule and laughter. As Bakhtin points out, the laughter which accompanies the grotesque body is never only directed at this body. Rather, it is an inclusive laughter which is directed at all bodies, including that of the beholder her/himself. Thus, the laughter which may be provoked by the grotesque features of my work is never only directed at the (often deeply serious) approach of the performance cultures it seeks to challenge, but also – and usually much more so - at my own and the audience's complicity in and compliance with the behavioural and physical regimes the work seeks to undermine. In this respect, the incorporation of grotesque features in the sonification methods and visually perceptible technologies connects to Craig Owens' idea of an 'unavoidable necessity of participating in the very activity that is being denounced precisely in order to denounce it' (1984: 235), which I identified as a framework for the critical strategy I introduced in chapter three.

When considering the grotesque sonified body in relation to the concept of 'sonic enfreakment', another aspect of interest in *Feedback*, *ELECTRODE* and *SUIT* is that my body is never presented *only* in a grotesque way. Grotesque body features are always perceptible *alongside* versions of these features, which I have described as 'normative' in the previous chapter. In *Feedback* and the beginning of the *SUIT* performances, the grotesque sonic representation of my heart outside my body is accompanied by a visual presentation of my body that largely corresponds with what

Bakhtin calls the 'classical' image of the body[3]: a lithe, toned body, the organic and fluid contents of which are safely contained by its closed boundaries. Similarly, the grotesque reference to faecal incontinence in *ELECTRODE* is accompanied by the 'action man pose' I discussed in chapter three and which very much conforms to the idealized body representations in classical sculpture.

As I suggested above, what distinguishes an approach that acknowledges the grotesque aspects of the technologized body from the critical strategies to biosignal sonification discussed in the two previous chapters, is the focus on the comical affordances of the work as a component of its critical dimension. A heightening of the perceived grotesqueness of the technology and the way it is used for body sonification can be employed as a strategy to present the work's critical aspects as a not entirely negative stance. The humorous element arguably facilitates a Bakhtinian process of regenerative degradation of the work's critical paradigm, thus making it more accessible.

A heightened perception of the grotesqueness of certain aspects of a work can be achieved by deliberately emphasizing these elements in the conception of the work, but it can also be facilitated by the media representations and the documentation accompanying the work. I pursued the latter approach in the press release (see appendix V) and the work descriptions, which I distributed preceding the presentation of *ELECTRODE* at the Czech music and sound art festival *Ostrava Days 2011* and the event in arts venue *The Basement* in Brighton, which I organized in fulfilment of the practical requirements of this doctoral research project in September 2011.

Deliberately highlighting the role of the lower stratum of the body in the work, the press release was entitled 'Performance with Anal Electrode in The Basement, Brighton'. Furthermore, the information brochure which accompanied the press pack and which was given to visitors of the events, deliberately referred to the performance action as 'faking orgasm' rather than 'simulate movements related to orgasm' in order to play on the association of ejaculation with the grotesque excretion of bodily fluids, rather than the scientific connotations of the action. Events magazine *The Brighton Source* clearly picked up on the grotesque aspirations of the press release and further amplified this in their own version of the announcement of the event, which suggested that '[i]t might be a deep and probing show, but it could

[3] Bakhtin suggests that the pendant of the grotesque body, with its focus on orifices and substances from its interior, is the concept of the body propagated in classical art.

turn out being a bit shitty' (*The Brighton Source* 2011: 54-55). Similarly, the description in the accompanying brochure appears to have contributed to the reviewer for the Czech centre-right newspaper *Lidové Noviny*'s experience of the work as a grotesque spectacle that combines the unsettling with the comical. He writes that when he read the description of the work in the brochure it seemed 'a bit scary', but was then apparently relieved by the down-to-earth experience of the actual performance, which he notes as being 'one of the most solid moments of the evening', and even awards me the honorary title 'Jimi Hendrix of the sphincter' (Klusák 2011: n.p.) in the end of his review.

CHAPTER FIVE
SONIC PROSTHETICS

In the previous two chapters, I developed approaches to biosignal performance that seek to establish the performer's body as a juxtaposition of elements of normativity and self-enfreakment in order to complicate common expectations of appropriate appearance and behaviour. The concept of the freak and self-enfreakment underlying these chapters drew from the characteristics of the sideshow freak discussed by Robert Bogdan (1988), which are usually focused on physical anomalities. In this chapter, I focus on non-normative approaches to the organization of personal space, a trait that has not commonly been featured in traditional sideshow contexts. Although people with a lack of social skills and understanding of personal space are colloquially often designated as freaks[1], this trait in itself does not adhere to the definition of the freak which forms the basis of the explorations of this thesis: Being a freak is an identity that is consciously and deliberately constructed by means of heightening a person's non-normative characteristics. However, in this chapter, I will develop a strategy of actual 'enfreakment', which involves the *deliberate* orchestration of spatial sonic cues to evoke non-normative experiences of personal space in the audience's perception of a performer.

I introduce an approach to biosignal sonification that uses different methods of spatial sound diffusion to evoke the experience of infringement of the audience's personal space. Drawing from theories in posthumanism, I conceptualize the sound and its technology as a prosthetic extension of the body. I suggest that spectators' experience of proximity to a sonically prosthetisized performer may be influenced by applying different methods of sound spatialization to sonified biosignals and discuss how this theoretical framework informed my performance project *SUIT*, which I introduced in chapter four.

I start with a reading of *SUIT* from the perspective of theories in posthumanism. I take Katherine Hayles' (1999) concept of the posthuman body as a 'material–

[1] An example of such use of the term freak is the description of American psychotherapist William J. Cook (2010) of 'an attractive 13-year-old' with Asperger's disorder who experiences her social position as being 'a freak', because she has 'no understanding for the nuances of communication [and] little comprehension of personal space and tact' (2010: n.p.).

informational entity' as a starting point to suggest that the sonified biosignals and sound technology in *SUIT* can be regarded as prosthetic. In the second part, I connect this concept of 'sonic prosthetics' to psychology research into the experience of proximity and acoustics research into the perception of distance to argue that variations in the spatial diffusion of the sound can be used to evoke different audience experiences of intimacy towards a sonically prosthetisized body. In the conclusion of this chapter, I briefly discuss how the theory and practice I introduced may play a role within discourses around the politics of technological body extensions.

Posthumanism and biosignal performance

In *SUIT*, the sound texture generated by the computer program is based on the audio signal from the Doppler heart sensor, which is modulated according to the data from the humidity sensor inside the PVC overall. Both these parameters change under the influence of my body's containment by the suit; when I wear the suit, my heart rate increases and I start to sweat excessively. Thus, the sound in *SUIT* is effectively a mediation of the interaction between my body and the PVC overall. The sound is generated using data originating from my body, and the correlation between generated sound and visceral body is easily perceptible. Therefore, the sound may be considered part of an informational network connected to my body.

Cyberneticist Gregory Bateson introduced the concept of the body and the tools it uses as an informational network. In *Steps to an Ecology of Mind* (1972), he proposes a theoretical distinction between the analysis of physical phenomena in Newtonian science and the study of informational processes in cybernetics. Bateson argues that in cybernetics it is not the 'physical individual', but the 'network of pathways of messages', leading from and to a person, which is relevant. He suggests that 'it is not communicationally meaningful to ask whether the blind man's stick or the scientist's microscope are "parts" of the man who uses them' (1972: 250–51). What is relevant is that both the stick and the microscope are pathways of information and thus form parts of the communicational network connected to the person using these objects. Drawing from Bateson's cybernetic perspective on the body, in this chapter, I conceptualize the sound in *SUIT* as part of the 'network of pathways of messages' connected to my body.

In her book *How We Became Posthuman* (1999), N. Katherine Hayles argues that in contemporary information society a person becomes posthuman as soon as she/he enters a 'cybernetic circuit that splices will, desire, and perception into a

distributed cognitive system in which represented bodies are joined with enacted bodies through mutating and flexible machine interfaces' (1999: xiv). Thus, a person could be considered posthuman as soon as she/he starts to communicate with another person by means of, for example, a computer chat program. Drawing from Bateson's theory, she conceptualizes the posthuman body as a 'material–informational entity' (1999: 3): an intertwinement of what Bateson calls the Newtonian (physical) and communicational (informational) worlds. For a 'posthuman' subject, a physical element would be considered part of the body if it functions as a facilitator of the person's communicational network; the microscope is considered part of the scientist's body as long as the person is using it to take in information. Explaining the difference between a Newtonian and a communicational perspective, Bateson distinguishes the physical phenomenon sound from the message this sound may convey. Thus, the 'material' part of Hayles' 'material–informational' body may also be a physical phenomenon that is not a material substance.

My approach to digital performance with sonified biosignals in this chapter takes builds on a conceptualization of the performing body along the lines of Hayles' concept of the posthuman body as a 'material–informational entity'. Since I consider the sound as a facilitator of the informational network connected to my body, I conceptualize the (physical phenomenon) sound and the technology that is used to generate it as a material part of my body: a 'sonic prosthesis'. However, rather than being concerned with an investigation of an actual process of making my body 'posthuman' by means of connecting it to performance technologies (as artists such as Stelarc and Eduardo Kac would have it[2]), I use this concept in context of German philosopher Stefan Herbrechter's (2009) suggestion of posthumanism as a primarily discursive concept.

Herbrechter argues that the question of whether concepts of the posthuman describe an empirical reality surely is of interest, but that this is not the only issue that should play a role in a discussion on their cultural relevance. Taking his cue from a Foucauldian concept of discourse, he suggests that all texts concerning a certain object, either affirmative or negative, have in common that they presuppose the existence of the discursive object; when a discourse has been circling around a (real or fictitious) object

[2] Kac inserted a microchip in his leg to demonstrate what it is like to become cyborg (*Time Capsule* 1997) whilst Stelarc aims to demonstrate the superiority of the technologically enhanced body of the future in work that features his body connected to robotic extensions (e.g. *Movatar* 2000; *Exoskeleton* 1997; *Third Hand* 1976-1981).

of discourse by means of repetition, emphasis and insistence for a period of time, this object of discourse will start to function as a cultural political entity of power and fascination and is of interest as such. Accordingly, Herbrechter suggests that performance artists who propose themselves as '(proto)posthuman subjects' (2009: 37) make symbolic statements which can be regarded as texts in the discourse around posthumanism. Thus, I do not propose the posthuman conceptualization of my body in *SUIT* as a statement about a possible future condition of 'the' body. Rather, I suggest it as a text in the discourse on the role of new technologies in the perception and experience of the body in contemporary society.

Here, one might wonder what the interest would be to create such a 'text'. Why bother investigating a body concept if there is no interest in its material realization? A cue to the answer to this question may be found in the opening of Donna Haraway's 'Cyborg Manifesto' (2000 [1985]). Haraway explains that her concept of the cyborg is conceived as an 'ironic political myth' (2000: 69), rather than a prognosis of the future implications of the technologization of bodies. She uses this myth to rethink the way in which gender differentiation in Western society is perceived in conjunction with essentialist definitions of gender, race and class. Once the body is perceived as a modular structure, the notion of gender as defined through a specific combination of physical characteristics becomes unstable. This rethinking is not so much dependent on an actual process of change in the material composition of bodies (although actual innovations in medical and industrial technologies are one of the triggers for Haraway's theory), as it constitutes a departure from the notion of culture as a development from an original unity.

Haraway points out that both the ideology of patriarchal society and Marxist-feminist thought are based on the notion of gender identity being inscribed in an original, natural human body, which existed when the subject was born. Although Marxist-feminism rejects patriarchal power structures, which are enforced through gender discriminatory body politics, Haraway suggests that it is unlikely to overcome these structures because it is based on a reinforcement of the notion of an original and essential difference between bodies.

However, if we think of the body from a cyborg perspective, its identity can no longer be traced back to an original unity; since the cyborg body is modular and its parts are exchangeable, it does not have one singular form from which it originates. If the body's parts and characteristics are thought of as (theoretically) exchangeable, this also

means that traditional thinking in binary gender oppositions tied to a biological body becomes impossible. Thus, for Haraway the cyborg is an image of 'a creature in a post-gender world' (2000: 71), which allows us to move away from the binary thinking, which underlies the distribution of power in what Haraway calls 'White Capitalist Patriarchy' (2000: 78).

My proposal for a posthumanist approach to biosignal sonification in this chapter is motivated by a similar interest. Taking my cue from Haraway's 'ironic political myth' and Herbrechter's Foucauldian approach, I believe the relevance of a posthumanist approach to biosignal performance to lie in its function as a platform to challenge essentialist assumptions concerning gender and species, which underlie much of our everyday behaviour in society. By means of conceptualizing the organic body, technology, and sound as parts of one informational network, the performance environment is turned into a playground where potential critical aspects of a non-essentialist concept of the human body can be explored. Here, it is not of concern whether the proposed posthuman concept of the body will ever become a material or experiential reality outside the artistic paradigm. Instead, the *possibility* to establish these concepts artistically is used as a starting point for a critical inquiry into assumed essential traits in everyday life, regardless of whether we call this life 'human' or 'posthuman'. For example, if we could establish a modular, technologized body that blurs the distinction between human and non-human animal body characteristics in a performance context, what might this tell us about the way we construct the distinction between 'human' and 'animal' in everyday life?

In the next part of this chapter, I take this approach to explore one specific perspective on a non-essentialist concept of the human body. I conceptualize the performance overall used in *SUIT* from a cybernetic perspective to explore how a posthumanist approach to biosignal performance can be used to investigate the experience of proximity in conjunction with the spatial distribution of sonified biosignals.

Biosignal performance and proximity

As I have discussed in this thesis, since the 1990s, a substantial amount of research has been done into the use of biosignals for sound synthesis and a number of artists have used biosignal sensor technology to synthesize sound and trigger pre-recorded sound in

their work. However, the role of the spatial diffusion of sonified biosignals in spectators' experience of the performer's body has not been explored.

In the following, I examine how the spatial diffusion of the sound of a sonic prosthesis may affect the experience of a performing body. Building on anthropologist Edward T. Hall's concept of the dynamic perception of personal space, my approach towards spatial diffusion of sonified biosignals in *SUIT* is aimed at simulating aural proximity cues that may at times evoke audience members to experience an intrusion of their personal space.

Edward T. Hall introduced the term 'proxemics' for 'the interrelated observations of theories of man's use of space as a specialized elaboration of culture' (1966: 1), for example, the distance people keep in interpersonal communication or the way architectural design affects people's behaviour. Hall suggests that a person's sensation of intimacy is stimulated by visual, auditory, kinaesthetic, olfactory and thermal sensory inputs, originating from another person's body. The variation in emitted impulses per individual and differences in culturally determined customs concerning the perceived intimacy of certain sensory impulses make it so that a human's perception of space in relation to other people is dynamic. In the organization of personal space, Hall identifies four categories of distances and concomitant voice levels that Americans (and most North Europeans) use in specific social situations: 'Intimate distance' encompasses a high probability of physical interaction and a heightened level of sensory inputs and is used for activities such as wrestling and sexual intercourse, as well as intimate interaction among family members or close friends. 'Personal distance' is used for less intimate interactions, with less sensory involvement, for example, talking to friends or acquaintances in a public space. 'Social distance' is used for more formal interaction with acquaintances and in business situations. 'Public distance', finally, is used when a larger audience is addressed.

As can be seen in the chart in Figure 5.1, the metric distances commonly associated with these four distance categories have concomitant levels of intensity in terms of perceived aural ('voice loudness'), olfactory (body odour, breath, etc.), kinaesthetic (possibilities to touch) and thermal (body warmth) cues. An experience of violation of personal space may occur when a person is confronted with a sensory impulse that does not conform to these cultural conventions. This may be when a person is approached to a metrical distance that is considered too intimate for the relationship this person has to the other. However, perception of space is dependent on a

combination of different sensory impulses. Therefore, an experience of violation of personal space may also occur when certain sensory impulses emitted by the other are stronger than what is culturally conventional. Looking at the chart in Figure 5.1, this may be illustrated. If, for example, a certain person has a strong body odour, that can be perceived at a distance of, say, 6 feet, this person could evoke the experience of being at intimate distance whilst she/he is at what would in metrical terms be considered social distance, close phase (4–7 feet). In a similar manner, an experience of reduced proximity may also occur, for example, when two people are separated by a glass plane. Here, body heat and odour may not be perceptible by the other person, so that an experience of personal or social distance may be evoked despite a metrical distance of less than 1 foot.

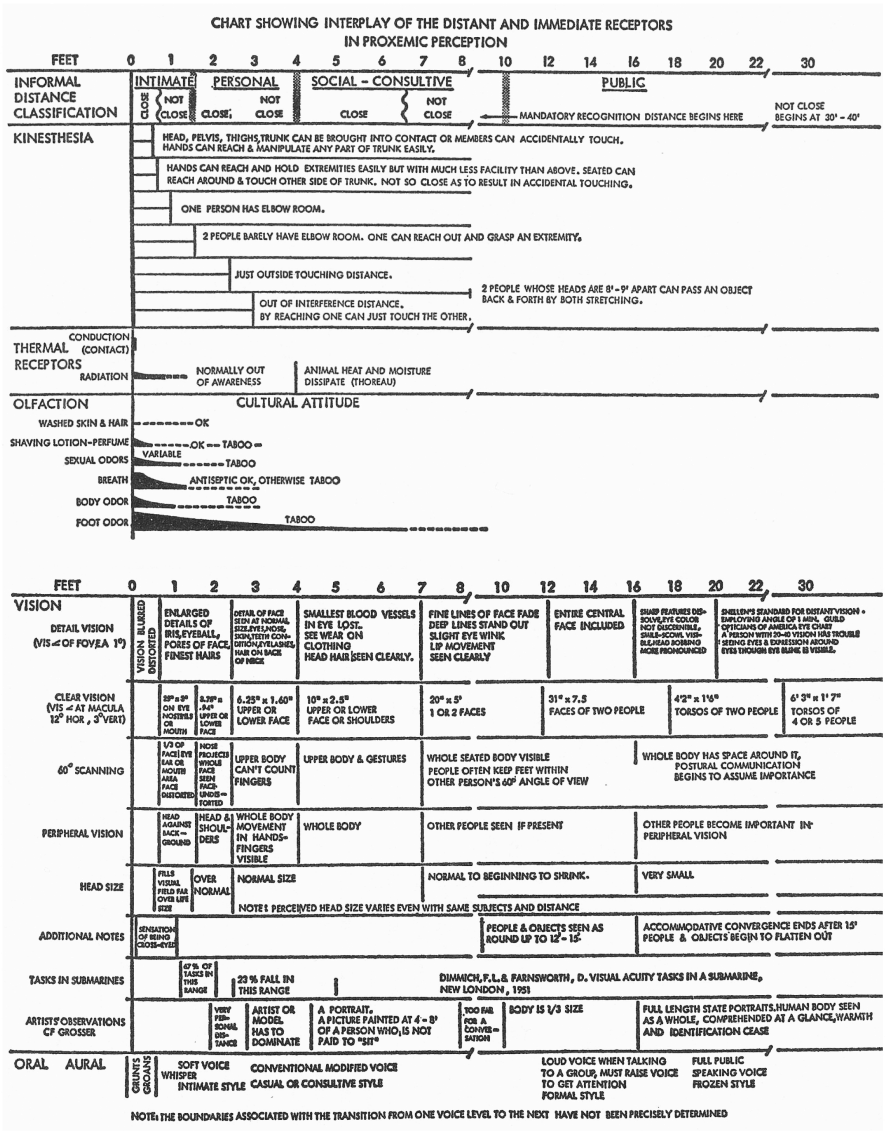

Figure 5.1. 'Chart showing interplay of the distant and immediate receptors in proxemic perception' from E.T. Hall, *The Hidden Dimension* (1966).

'Voice loudness' is the only aural cue identified by Hall. He suggests that, in dyadic communication, vocal amplitude increases when interpersonal distance gets bigger in order to assure adequate communicative reception by the other person. The levels of loudness range from whispering at intimate distance to very loud at public distance. In the following, I draw from research into the simulation of proxemic cues in virtual reality environments to suggest how adding voice-related proxemic aural cues to a sonic prosthesis may affect spectators' experience of proximity to a performing body in a manner similar to the examples with body heat and odour I gave above.

Proximity and virtual bodies

Virtual environments are increasingly used in research of proxemic behaviour and are of relevance to my approach to the simulation of aural proxemic cues in *SUIT*. Bailenson et al. (2003) describe proxemics experiments they conducted with digital immersive virtual environment technology (IVET). In the experiments, participants were wearing a head-mounted display (HMD), whilst their movements were registered with position tracking cameras. Participants were asked to interact with three-dimensional computer-generated representations of another human. The outcomes of the experiments suggest that the proxemic behaviour people show when confronted with non-material bodies is comparable to when people are confronted with visceral human bodies, especially when the non-material body is believed to be an avatar controlled by a real human: in case of perception of an avatar, the threshold for proxemic behaviour is usually lower than in the encounter of virtual bodies which are believed to be controlled by virtual agents. Furthermore, the more realistically human gaze behaviour was simulated, the stronger the proxemic behaviour. Thus, IVET-based research demonstrates that the presence of a material, visceral body is not a condition for proxemic behaviour to occur. When people consciously know that they are encountering a virtual body, their proxemic response to that body does not necessarily change. Rather, proxemic behaviour appears to increase according to the amount of individual cues (such as gaze behaviour) that cause sensory impulses similar to those resulting from visceral bodies, as well as the extent to which the non-material body is believed to be controlled by a human agent.

Two aspects of these experimental outcomes are of relevance to my discussion of proxemics and digital performance with sound: first, the finding that proxemic behaviour (which signifies the experience of a specific degree of proximity) also occurs when only part of the sensory cues that would normally emanate from a visceral body are present. As I mentioned above, the sound of the human voice is the only sound originating from the body discussed by Hall. Drawing from the outcomes of the IVET-based research, I suggest that simulation or emulation of only part of the aural cues that would normally facilitate the perception of proximity of a human voice will also evoke proxemic behaviour. Second, the apparent increase in proxemic behaviour when a non-material body is believed to be controlled by a human being is of relevance. Considering this phenomenon, I suggest that sound which is perceived as correlated

with (and thus to an extent 'controlled' by) other parts of a certain person's body is more likely to evoke proxemic behaviour. In a sonically prosthetisized body, the sound and its technology are regarded as actual parts of the body. This implies a heightened sense of correlation between sound and the rest of the performer and thus a higher probability that proxemic behaviour will occur.

The human voice and perception of distance

To determine what aural cues are most relevant in the perception of distance of a human voice (and therefore most worthwhile to simulate in a performance set-up), I consider acoustician Søren H. Nielsen's (1993) experiments into aural distance perception, in which he used recordings of a human voice played back over loudspeakers positioned at different distances and angles from the subjects. Nielsen observes that, in a reverberant room, 'the main factor changing as a function of distance is the ratio between direct and reverberant sounds' (1993: 767) and that loudness influences distance perception far less than has been suggested in previous research. The reverberant rooms used in Nielsen's experiments were between 8 and 9 m long, which is comparable to the size of many indoor performance spaces. In these rooms, overall loudness remained almost the same, regardless of distantiation. Nielsen attributes the fact that changing loudness has been most widely accepted as a distance cue to the fact that most earlier research has been based on experiments in rooms with no or very little reverberation. As discussed above, Hall emphasizes the relevance of 'voice loudness' in the dynamic perception of proximity. However, drawing from Nielsen's research, I suggest that in Hall's observations, which were definitely not made in anechoic chambers, the perception of proximity would to a large extent have been facilitated by changes in the ratio between direct and reflected parts of the perceived voice sound; when a voice is perceived at a more intimate distance, this is more likely to be caused by a bigger ratio between direct and reflected parts of the sound than an actual increase in overall loudness.

Aural simulation of proximity with a sonic prosthesis

The proxemics research with IVET mentioned earlier shows that only part of the cues that affect proxemic behaviour in an encounter with a visceral body need to be simulated in order to facilitate proxemic behaviour in an encounter with a non-material body. Combining this with the outcomes of Nielsen's experiments, my explorations of different sound diffusion methods for the sonic prosthesis in *SUIT* are concentrated on

methods to change the ratio between the audience's perception of direct and reflected sound. Thus, *SUIT* constitutes a practical environment in which I explore the hypothetical concept of aural proxemic cues in 'posthuman personal space' that I have set up in this chapter.

Motivated by my interest in consumer technologies I deliberately chose to follow a Do-It-Yourself strategy in the work. The spatial diffusion methods I describe here follow this approach in that they use widely available hi-fi equipment and simple loudspeaker arrangements, rather than state-of-the-art studio set-ups for sound spatialization.

I propose several practical methods of sound distribution that may be employed to influence the ratio between the perceived direct and reflected parts of the sound of a sonic prosthesis. I divide these methods into two categories: (1) methods that are aimed at limiting the amount of reflection of sound on walls and other objects in a performance space; (2) methods that are aimed at enhancing the amount of reflection. In the former case, a sound source is expected to be experienced at closer distance, whereas in the latter case, greater sound source distantiation is likely to be experienced. The division into only two categories here is made to enhance clarity of the discussion. In practice, a continuous change of perceived distance may be evoked by means of combining aspects of methods from both categories.

1. Predominantly direct signals (sound source is perceived at close distance):

- Sound emitted by headphones, worn by the spectators
- Sound emitted by a number of hi-fi loudspeakers, surrounding the spectators at close distance
- Sound emitted by ultra-directional loudspeakers, aimed directly at individual spectators

These three methods are aimed at directing the sound at the spectators' ears as directly as possible. Obviously, the use of headphones is the most effective method for this purpose. Here, there will be absolutely no indirect signals because the sound is emitted straight into the spectator's ear. However, in a performance situation, the action of having to put on headphones may draw the spectators' attention away from the simultaneous visual and aural perception of the performer's body to an engagement with the headphones themselves. Alternatively, one could argue that the headphones form part of the performer's sonic prosthesis. Thus, the spectators would have a choice whether they would like to bring this part of the performer's body within their personal

space. The second method reduces the spectators' ability to control the amount of exposure to the sound source. If an audience were to be situated in a space confined by loudspeakers, whilst there is a certain amount of peer pressure not to leave the performance space (as is usually the case in a performance situation where a group of spectators is seated in a more formal theatre set-up), they may be confronted with a direct sound signal that causes a degree of discomfort. This may also be the case with freely moving spectators when the loudspeakers confine a large area of the performance space. However, the effect of directly aiming ordinary, non-directional hi-fi loudspeakers is greatly diminished when the loudspeakers are not at close distance from the spectators, because the low directionality of the speakers' signals causes a great amount of reflections on the space's walls and other objects. This problem may partly be overcome with the third method. The use of ultra-directional loudspeakers enables directing a focused beam of sound towards a specific place or person in the performance area. When the area the sound is directed at is padded with sound absorbing material, the amount of reflected sound could be reduced further. Ultra-directional loudspeakers based on parabolic reflection of a sound source are relatively cheap or can be constructed with a satellite dish or a large plastic bowl.[3]

2. Predominantly indirect signals (sound source is perceived at far distance):

- Sound emitted by one loudspeaker, positioned at a distance from the spectators
- Sound emitted by a number of non-directional loudspeakers, aimed at the walls of the performance space

When a sound is emitted by a single loudspeaker that is not very close to a spectator in a reverberant room, the sound will usually reach the spectator's ear from many directions. Most of the signals will be reflections, rather than direct sound. Similarly, the amount of reflected signals can be increased by aiming a number of loudspeakers towards the walls or other objects in the performance space, rather than directly at the spectators.

Performance experiment

As part of the *SUIT* project, I have applied two of the methods proposed above in an experimental performance set-up: sound emitted through headphones worn by the

[3] Parabolic loudspeakers are often marketed as so-called 'sound domes'.

spectators was alternated by sound emitted by one loudspeaker positioned at a distance from the spectators.

I performed an informal experiment, in which I confronted several spectators with two short performances with the PVC suit. In these performances, which took place in a space of approximately 30 by 60 feet, my performance assignment was to hold on to a metal bar connected to a rope hanging from the ceiling until fatigue of the arm muscles would necessitate releasing the bar (Figures 5.2 and 5.3). This sequence was to be repeated several times, each time after a short interruption. Whilst hanging, my body started to spin because of the un-twirling of the rope under the pressure of my body's weight. In the first performance, the sound was distributed over the performance space through the loudspeaker in the back of the suit. In the second performance, the sound reached the spectators' ears directly through the headphones. During the performances, the spectators were allowed to move freely through the performance space. The length of the audio cables connected to the headphones used for the second performance was such that it did not significantly restrict spectators' freedom of movement.

Figure 5.2. Performance experiment

Figure 5.3. Performance experiment

The two conditions of the performance experiment are documented in the video recording on the DVD accompanying this thesis. Needless to say, this documentation material does not offer an exact replication of the performance situation and the proxemic experience of this material will not be identical to an experience of the live performance. However, when perceived through headphones, the sound of the video recording gives an impression of the sonic difference between the two conditions in the experiment. In the first fragment, the sound was emitted by the loudspeaker in the suit and recorded by a microphone in the position of the video camera. Thus, the soundtrack here consists of a mix of direct signal and the reflections of the signal on the walls of the performance space. In the second fragment, the generated sound was recorded directly onto the sound track of the video, so the soundtrack is identical to the direct signal which would be emitted through the headphones during the live performance.

I evaluated the experiment informally in conversations with the spectators. I chose this approach because the objective of the experiment was to explore practical artistic applications of the theory introduced in this chapter, rather than collect empirical evidence for certain behavioural patterns. I asked spectators to describe their experience of the performances in individual conversations. All of them identified the sound as originating from my heart. They also indicated that when the sound was distributed through the headphones, they experienced it as much 'closer'. One person indicated that it was as if she was inside my body. Several spectators said that they found the sound 'quite disturbing' in both performances, but more so when the sound was distributed through the headphones.

During the performances, none of the spectators chose to approach my body from less than approximately a 10-foot distance. Apparently, they chose to stay at what Hall describes as 'social distance'. I suggest that their choice to not approach further was motivated by the somewhat uncomfortable situation of my body being exposed inside the transparent suit in an obviously distressing condition. If I had not worn the suit, sounds originating from inside my body would only have been audible at intimate distance (one would have needed to put one's ear on my chest). Now, however, sounds representing movement inside my body were perceptible at much greater distance. Thus, despite the spectators' choice to stay at 'social distance', they were confronted with a sound evoking the experience of 'intimate distance'. The fact that three spectators indicated that they experienced this sound as uncomfortable and experienced greater discomfort when the sound was played through the headphones, combined with the description from all spectators that the sound playing directly through the headphones was experienced 'closer' than the sound emitted by the loudspeaker in the suit, supports my suggestion that the experience of proximity of a sonically prosthetisized body can be influenced by changing the ratio between direct and reflected parts of the sound. Furthermore, the descriptions of discomfort experienced by some spectators suggest that the sonic stimulation of an experience of increased proximity may evoke a perceptual experience that is comparable to an experience of intrusion of personal space.

CONCLUSION

The critical framework of this study, which I presented in chapter two, built on analyses of mass media representations of performance art. I proposed that body-based performance art practices can be read in the context of the history of freak show performance. In chapters three, four and five I used this concept as a framework for several explorations of ways to conceptualize a cultural critical approach to biosignal sonification in performance art. Having come to the end of this thesis, I would like to evaluate these approaches and reconsider them in the context of the research questions introduced in chapter one.

In chapter three, I suggested an approach to performance art with sonified biosignals, in which strategies that can be identified as adhering to normative technological paradigms, are deliberately juxtaposed with references to technologies which are commonly considered 'inappropriate' for 'the' male body. Accordingly, the processes of biosignal sonification and the integration of their technological artefacts in *Feedback* and *ELECTRODE* explore the intertwinement of normative body representations and conduct with carefully chosen acts of self-enfreakment. The objective of the approach to biosignal performance proposed in this chapter was not to develop a gender critical stance that positions the work and the artist outside the cultural practices that are held up for scrutiny. Rather, its critical aspect is framed in an acknowledgement of the artist's position as part of - and her or his complicity in[8] - the economy of popular media representations of the body. The approach can thus be seen as an exploration of art theorist Craig Owens's proposition of postmodern performance practice's 'unavoidable necessity of participating in the very activity that is being denounced precisely in order to denounce it' (1984: 235).

In chapter four, I explored the concept of the fragmented digital double as a Bakhtinian grotesque body representation. I argued that a digital representation of a performer may constitute a recognizable representation of a 'whole' performer, as becomes apparent in the examples Steve Dixon offers in *Digital Performance* (2007),

[8] Amelia Jones (2004) argues that performance artists' circulation of images of their bodies and their interest in being represented in the media makes them complicit in commodity fetish culture.

but a performer may also be represented partially and in multiple, fragmented manners simultaneously. If we consider the clear demarcation between the body of the performer and its double in Dixon's examples from a Bakhtinian perspective, it becomes apparent that it maps conveniently on Bakhtin's description of the classical body as a 'finished, completed, strictly limited body' (1984: 320), its interior securely separated from the outside world by its smooth, impenetrable surface. Bakhtin points out that in representations of the classical body, 'the exact position and movements of this finished body in the finished outside world are brought out, so that the limits between them are not weakened.' (1984: 321).

Whereas the grotesque body challenges the body's boundaries' absoluteness and seeks to place its perceived or assumed identity in a realm of playful ambivalence, the classical body is very much a fixed entity that opposes infringements on its closed nature, which is usually constituted on the basis of a desire to conform to certain beliefs of ideal physical proportions and norms of appropriate conduct. Considered from this perspective, the unified, whole digital double featured in Dixon's examples appears to be a somewhat troubling advocate of an essentialist concept of the human body with a fixed identity and always separate from other bodies. My strategy to use sonified biosignals to represent a grotesque, fragmented body seeks to challenge such essentialist notions of the human body for a more flexible perspective on the body that allows for a multitude of accepted forms and behaviours.

The humanist concept of an essentialist, clearly demarcated human body, which underlies the concept of the classical body Bakhtin describes, was subjected to a closer examination in chapter five, where I developed a posthumanist perspective on biosignal performance, which seeks to blur the boundaries between performance technology and the performer's body. I suggested a new approach to the spatial distribution of sonified biosignals, based on a conceptualization of the sound, and the technology used to generate it, as a 'sonic prosthesis'. I proposed several practical sound distribution methods that would evoke audience experiences of different degrees of proximity by means of controlling the amount of reflection of the sound in a performance space. The technical aspects of this approach to sound diffusion may be explored more extensively. However, what is of greater interest for the objectives of this thesis are the proposed methods' implications on body politics in the context of a broader discussion of the (post)human body. For example, how does this approach relate to Stelarc's (1991) claim that the body is 'obsolete' and how can the development of a technique that establishes

a ‘freak body’ that sonically violates spectators’ personal space be read in relation to Donna Haraway’s image of the cyborg as ‘a creature in a post-gender world’ (2000: 70)?

In the performance experiment I described, spectators took notice of my body (they stayed at a certain distance from it) and related their sonic experience to my body (they identified the sound as originating from my heart). Therefore, I suggest that the discomfort triggered by the proximity of the sound source could also be traced back to the interdependence of sound and visceral body in the performance; people’s experience of proximity with non-material bodies apparently draws from previous experience with visceral bodies. Thus, the exploration of the posthuman body facilitated by the approach to sonic prosthetics presented in chapter five suggests the continued relevance of the visceral, organic body, rather than its ‘obsolescence’. The approach also does not appear to fit comfortably with Haraway’s image of the cyborg as a utopian being, detached from the western ‘tradition of racist, male-dominant capitalism’ (2000: 70): instead of a utopian means towards a world beyond gender- and race-related power politics, the posthuman body introduced in this chapter is largely still the same sexed and gendered body as it was in the heydays of humanism. The potential to sonically invade people’s personal space with this body suggests the uncanny prospective of a continuation of existing conflicts of domination and control, in a technologically mediated – and potentially technologically amplified – milieu.

Concerning my research question about the way in which methodologies of biosignal sonification in performance art could play a role in a critical engagement with the politics of body representation, a common theme underlies the different approaches introduced in these three chapters: The potential wider cultural connotations of sound and sonic experiences are of primary importance in the conceptualization of performance work. Spectators are likely to have certain expectations based on the work’s specific material, spatial and temporal circumstances. In the different strategies introduced throughout this thesis, sonic material and sound technologies are devised in such way that the cultural paradigms they are associated with at times contradict and undermine these expectations. These strategies may build on the gender connotations of certain sounds and their technologies, use sounds associated with the inside of the body to facilitate experiences of the grotesque, or utilize the spatial perception of sound material to affect spectators’ experience of personal space.

With respect to the second question I presented in the introduction of this thesis, this focus on the wider cultural connotations of sound is of particular interest in conjunction with readings of body-based performance art practices in the context of the tradition of freak show performance. Building on my suggestion that body-based performance art practices may be read as a freak show act, and thus contained as harmless entertainment in the observers' experience, chapters three, four and five have all explicitly acknowledged the freak show-like affordances of my performance works *ELECTRODE*, *SUIT* and *Feedback*. However, rather than attempting to downplay this aspect of the works, the approaches introduced were aimed at deliberately heightening the acts of self-enfreakment in the works, whilst simultaneously undermining their affordance as a genuine freak show performance through the conspicuous inclusion of conflicting normative elements. The critical aspect of the attitude toward biosignal sonification in this thesis can therefore be located in the attempt to unbalance and confuse the spectators' experience of the works in terms of the intertwinement of adherence to ideologies of normative body ideals, and simultaneously deliberately referring to the spectacular nature of the freak show.

Media Response

The ambiguous nature of the spectators' experience of the performance work created in the context of this thesis is also suggested by media responses to *ELECTRODE*. As I mentioned in chapter four, one of the biggest national newspapers in Czech republic, the centre-right *Lidové Noviny* (Klusák 2011; see Appendix VI) printed a short review of the work. The critic notes that his first impression was that the performance seemed 'a bit scary' (2011: n.p.), but that his actual experience of the work gave him a very different impression ('one of the most solid moments of the evening'). Despite this, he ends his review by giving me the probably humorously intended title 'Jimi Hendrix of the sphincter' (2011: n.p.). The freak show-like act of performing with my sphincter seems to have provoked his interest in the work and also served as a convenient framework to convey the work to his readers. On the other hand, the performance apparently also facilitated a more refined experience, which the critic seeks to convey alongside the more freak show-like references in his text.

Another insight into the affordances of my approach to biosignal performance in a mass media context was achieved during the aftermath of an encounter of *ELECTRODE* by journalists affiliated with the British tabloid press. In June 2011, I

received a phone call from a press agency editor who said that she works for 'the national papers' and was interested to make a reportage about *ELECTRODE*. Several days later, I showed a preview of the performance installation to a journalist and a photographer of the agency and had a quite long conversation with the journalist. The article, however, was never published. I asked the journalist if he would be willing to give me an insight into his agency's initial expectations of the story and the editors' response to the information he had submitted to them. After I promised him that I would not mention his name or the name of his agency, he agreed.

The email the journalist subsequently sent me (see Appendix VII) offered an interesting view behind the scenes of media coverage on performance art and contemporary art in general. As I had already suspected, the initial objective of the interview had been to produce a scandal story:

> [My editor] got it into her head that you were getting funded by the Arts Council to (her words) 'play the bum trumpet'. […] She envisioned a tabloid/Daily Mail story, where we whip up 'anger' from people like the Taxpayers' Alliance. The line would be – 'what a waste of money in a time of austerity for so-called 'art'. The article was going to poke fun at what you were doing, using the tag 'bum trumpet' to invite ridicule. (A 2011: n.p.)

The desire to frame *ELECTRODE* as a freak show act is apparent in the editor's suggestion to use the tag 'bum trumpet'; a freak who plays the trumpet with his rectum would surely have been a great asset for every side-show, alongside the sword swallower and the 'armless wonder' (see Bogdan 1988). However, after the journalist had seen and heard *ELECTRODE* and talked to me, he realized that the freak show framework would not fit comfortably with the work.

> When I met you, I quickly realised your performance was serious and actually very interesting. […] My photographer Darren also realised you would not be prepared to take part in a series of cheeky 'bum-trumpet' photos. Finally, you were not being funded for your work. No Story. (A 2011: n.p.)

Clearly, the fact that the work was not funded by the Arts Council was an important reason why the article was no longer interesting for publication. However, the journalist's account also shows that his experience of the work and the references to its wider cultural connotations complicated the envisaged freak show representation.

Does this suggest that *ELECTRODE* effectively realizes this thesis' objective to 'intertwine and complicate concepts of normativity "inside" performance work' (p. 35) by means of juxtaposing elements that afford associations with both 'freaky' and

normative cultural paradigms? To draw such grand conclusion on the basis of the single account discussed here would be an act of sheer reductionism, but the journalist's descriptions of the event *do* suggest that the work affords contradictory associations in the realm of the 'freaky' and the normative: The editor's initial response to documentation of the work shows its affordance as a freak show act equivalent, whilst the journalist's account of his experience suggests that it can also quite easily be read as a sensible piece of work, even by somebody who has his mind set on framing it as a freak show.

On the other hand, there is a somewhat more sombre message to be taken from the impression the journalist gives of the current media landscape. Although his own experience of *ELECTRODE* may suggest that the work can indeed trigger some critical engagement with notions of normativity, his views on the prospects of the work's potential in a broader media context are less promising.

> I think [a more nuanced article about the work] did not work because our media have one default setting….they take a sneering, cost-driven attitude to anything they don't understand. The papers cater for the mythical 'average bloke' (it normally is a man) who is (allegedly) suspicious of anything different or hard to understand. […] We have a sales-driven, timid media, scared to be elitist and largely driven by prejudice not curiosity. Even the so-called high-brow papers such as the Guardian are surprisingly conformist (A 2011: n.p.).

According to this account, my approach of intertwining the 'freaky' and the normative will probably not lead to a more differentiated media exposure of the work. On the contrary, it seems more likely to result in the work being barred from a wider media representation altogether.

The strategies to biosignal sonification in digital performance developed in this thesis frequently evoke challenging experiences among those who encounter the work during performance. However, considering the limited scope of acceptable representational frameworks for art practices that fall outside the norms of mainstream culture, these strategies are unlikely to facilitate a sophisticated representation of the work in popular mass media that would reach beyond the work's usual subcultural audience.

Future Perspectives

The research presented in this thesis is envisaged to be further developed in future work. The key importance of the wider cultural affordances of sound and sonic experiences, which was a central theme throughout this thesis, means that the attitude to performance

technologies underpinning this work can also be applied to non-sonic sensory triggers. Accordingly, my future inquiries will be concerned with a more general cultural critical stance to performance technologies, which does not focus on a specific medium format. This may be considered in the context of media theorist Lev Manovich's (2005) concept of the 'post-media era'. Manovich argues that the emergence of new art forms in the last third of the twentieth century, such as installation and conceptual arts, as well as the introduction of digital art forms, have made the traditional categorization of artwork according to their medium obsolete. Installation art, for example, may involve the use of different mediums in any combination. Consequently, in my more recent work, conceptual and analytical approaches are no longer specifically directed at the particular medium(s) used in the work.

Another theme of interest for future work has become apparent through the combination of theoretical inquiry and practical performance work that I engaged in as part of this research project. Following Craig Owens' proposition of postmodern performance practice's 'unavoidable necessity of participating in the very activity that is being denounced precisely in order to denounce it' (1984: 235), which I mentioned in my evaluation of chapter three, I realized that in my performance work I do not only participate in the cultural practices I seek to criticize, but I actually also genuinely enjoy these acts of participation. Although I engage critically with the idealization of mainstream body ideals in my theoretical work, in my experience of exhibiting my naked body in *SUIT* and *ELECTRODE* I turned out to be quite concerned with the way the audience would perceive my body in terms of whether it would be considered beautiful according to the very body types I critique in my writing. Arguably, this fascination with normative body beauty ideals can also be recognized in the work of Marina Abramović I examined in chapter two. My interest in juxtaposing the freaky and the normative introduced in this thesis will be further explored in this context. Here, the emphasis would be more explicitly on the representational formats for 'beautiful' and 'ugly' people in contemporary popular media, and thus divert from the focus on the tradition of the freak show that formed a starting point for the explorations in this thesis.

A central question would be whether it is possible to make performance work with naked bodies that engages with the palpable discrepancy between theoretical enquiry and artistic practice, which appears to be beyond the grasp of critical theoretical inquiry alone. Similar to the strategies described in this thesis, such performance work should strive for a confrontational ambiguity, where theoretical concerns are juxtaposed

with the artist's incompatible intuitive preferences. On one hand, the work would satisfy the audience's voyeuristic gaze, as well as my own concerns to 'look good', whilst displaying my naked body. However, this situation of indulgence would then be deliberately disturbed by means of a carefully constructed network of references to elements connected to the critical theoretical conceptualization of the work. The strategy of juxtaposing a vain 'Action Man' pose with references to faecal incontinence in *ELECTRODE* could be a starting point for such an approach.

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APPENDIX I
XENAKIS' STOCHASTIC DYNAMIC SYNTHESIS

Stochastic methods are based on processing random values, limited by a probability distribution. Despite the indeterminacy of individual values, the overall distribution of values over time can be predicted statistically. Xenakis started to use this approach to determine parameters such as pitch and duration in his orchestral scores in the 1950s (*Metastaseis* 1953-54; *Pithoprakta* 1956). In the 1970s, he started exploring the use of stochastic dynamic strategies for digital sound synthesis (for example, in his electronic composition *La Légende d'Eer* 1977-78). GENDY is a further development of Xenakis' stochastic dynamic synthesis work in the 1970s.

Xenakis introduced stochastic dynamic synthesis as an alternative to conventional sound synthesis methods. Until the introduction of stochastic dynamic synthesis, electronic sound synthesis methods were usually based on simple periodic functions (e.g. sine waves or square waves), which were subsequently altered through modulations and distortions. Stochastic synthesis, instead, starts off with randomly distributed values (i.e. white noise), which are subsequently set limitations by a probability distribution. A probability distribution is a set of numbers that indicates the probability of the occurrence of certain outputs (Roads 1996). The wave shape and amplitude of the sound are changed according to values based on pseudorandom numbers[1], which are compared to the probability distribution. Thus, sound colour, pitch and amplitude of the sound vary within certain limits. Within these limits, due to the probability distribution, the degree of change of the sound over time is variable but concentrated around a certain number.

Simplified, this could mean, for example, that the frequency of the sound is set to vary between 100 and 200Hz and the frequency change per second to be between 0 and 20Hz. If a bell-shaped probability distribution with its peak at the centre point would be used (see Figure I.1c), changes around 10Hz would occur most frequently. A pitch

[1] A pseudorandom number is a number read from a table of random numbers that was generated prior to the computational process and is stored in the computer's memory. This method is used to increase computational efficiency (generating actual random numbers in real-time during the sound synthesis process would be much more costly on processing time).

change of 4 or 16 Hz would occur considerably less often, whereas a change of 0Hz or 20Hz in one second would be highly unlikely. If the pitch moves over 200Hz or below 100Hz, the change is mirrored back into the set pitch domain. I.e. a 15 Hz increase from 190Hz would result in a pitch of 195Hz.

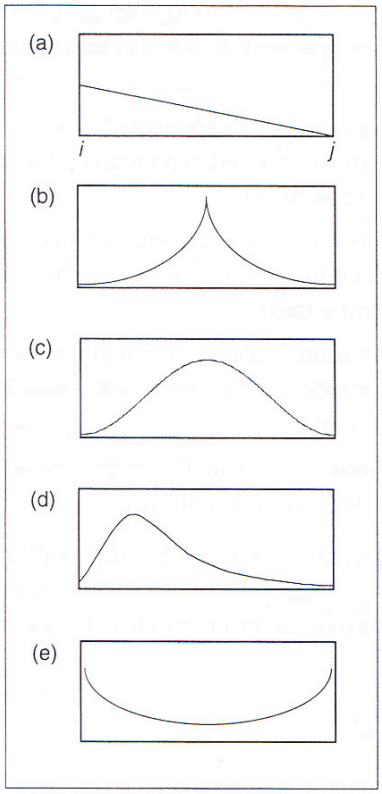

Figure I.1. Five classes of probability distributions. The vertical axis is the probability, going from 0 to 1. The horizontal axis is the range of values covered by the distribution (in case of the example in the text, this would 0 Hz – 20 Hz), i.e., the possible outcomes. (a) Linear distribution between two points *i* and *j*. (b) Exponential with peak at point *c*. (c) Bell-shaped with peak at point *c*. (d) Asymmetrical. (e) U-shaped (reproduced from Roads 2006: 875).

APPENDIX II

SUIT (2009-2010)

Material

-PVC go-kart rain suit

-Humidity sensor: Honeywell HIH-4030-001 (SMD)

-Doppler flow sensor: Jumper Medical *AngelSounds Fetal Doppler*

-30 x 30cm transparent Perspex sheet

-Elastic band and bra closures

-Loudspeaker: Capacity 80/100W, frequency range 60–4000 Hz

-Sensor interface: Make Controller Kit v1.0

-Computer: MacBook 2.4 GHz, running Max/MSP

-Sound card: PreSonus FireBox

-Hi-fi amplifier, 2 x 100W

Technical Description

I constructed a PVC performance overall equipped with humidity and Doppler flow sensors and a loudspeaker (Ploeger 2009a) (Figure II.1). The humidity sensor is placed under a piece of cloth inside a transparent plastic box, which is attached to the inside of the front of the overall. The sensor is wired to the Make Controller sensor interface installed in the front of the overall and connected to the computer with a long USB cable that leaves the overall through one of the legs (see Figure II.2).

The *AngelSounds Fetal Doppler* is also attached to the front of the overall (see Figure II.2). The Doppler sensor sends out a 3 MHz ultrasonic pulse signal[2] and registers the reflections of this signal, which return from the material it encounters (in this case my heart). I removed the original case of the device and extended the leads of the transmitter/receiver in order to attach the sensor to the outside of the suit (to avoid the sensor getting too humid) whilst the transmitter/receiver is connected to my chest inside the suit. The audio signal generated by the Doppler sensor is led into the sound card, which is connected to the computer via an audio cable.

[2] Manufacturer data from http://www.jumper-medical.com/en/products01.asp?menuid=11&id=5. Accessed 23 June 2011.

A square sheet of 1mm thick transparent Perspex is sewn into the back of the overall with thick nylon thread. A loudspeaker is installed in a circular opening in the middle of this sheet. The loudspeaker is supported by means of an elastic band, which closes around my chest with bra closures. A long speaker cable connects the speaker to the hi-fi amplifier outside the overall.

When I wear the suit, I start to sweat, which causes the humidity inside the suit to rise. As a result, the cloth surrounding the humidity sensor gets more humid and the registered humidity gradually increases during a performance. The data from the humidity sensor and the audio signal from the Doppler sensor are sent to a computer program written in programming language Max/MSP. When the humidity level is at or below the threshold set at the beginning of a performance (usually the humidity level inside the suit, before I put it on), the program emits the unmodified Doppler sensor signal. According to the increase in humidity, this signal is then sent through a bandpass filter, which gets narrower and narrower. Simultaneously, a pitched sound composed of three sine wave signals, with the centre frequency of the bandpass filter as its fundamental, is gradually added to the sound texture. The amplitude of this pitched sound follows the amplitude of the Doppler sensor's signal. Thus, throughout a performance the sound texture gradually transforms from the complex unmodulated signal of the Doppler sensor to a pitched sound composed of three sine waves that follow the amplitude of the Doppler flow signal. The amplified sound can be sent to the loudspeaker in the suit or to other sound sources in the performance space.

Figure II.1. PVC overall with humidity and Doppler sensors and loudspeaker.

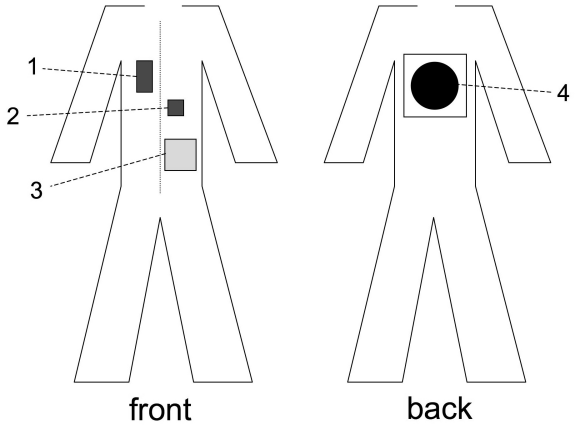

Figure II.2. Schematic representation of PVC performance overall: 1. Doppler heart sensor; 2. Humidity sensor; 3. Make Controller sensor interface; 4. Loudspeaker.

Performances

SUIT (performance #1: hanging/spinning) (2009)

A metal bar connected to a rope is attached to the ceiling. I hold on to the metal bar until I have to let go because of exhaustion of my arms. Whilst I am hanging on the bar, I start spinning because of the untangling of the rope. Once I have released the bar, I walk in circles in opposite direction to unwind the cables attached to the overall. I repeat this action. Sound is synthesized whilst my body is in contact with the bar. The performance ends when the sensor registers 100% humidity inside the overall. A piece of cloth covers the humidity sensor so that the process of humidity increase takes between 10 – 20 minutes.

SUIT (performance #2: swinging) (2009)

I hang on a pendulum attached to the ceiling. I swing back and forth until I have to let go because of exhaustion of my arms. The performance ends when the sensor registers 100% humidity inside the overall. A piece of cloth covers the humidity sensor so that the process of humidity increase takes between 10 – 20 minutes.

PLAY & PRODUCTIVITY (2009)

Performance installation in two large spaces. First space: live video projection of my performance in the second space. Video projection of my cousin Nico working as a dustman. Two televisions with video recordings of Nico's and my own face. Headphones with a live transmission of the sound generated by the PVC performance

overall I use in the second space. Second space: Used dustman suit, suspended from ceiling. Live performance: *SUIT (hanging/spinning)* (see above).

SUIT (performance #3: lifting) (2010)
I lift two large active loudspeakers. I walk in circles until I can no longer hold on to the loudspeakers. Once I drop the loudspeakers, the sound stops. I walk backwards to undo the cables attached to the overall. I repeat the action. Every time I lift the speakers, the sound is played through a different loudspeaker set up: the loudspeaker in the overall; the active loudspeakers I am lifting; a directional loudspeaker aimed at a specific area in the performance space; a multi-loudspeaker setup installed on the walls of the space. The performance ends when the humidity sensor registers 100% humidity inside the overall. A piece of cloth covers the humidity sensor so that the process of humidity increase takes between 10 – 20 minutes.

SUIT (performance #4: jumping) (2010)
Performance for video
Duration: 1’45’’
I jump in circles. The humidity registered by the sensor inside the suit is projected on the wall behind me. The performance ends when 100% humidity has been registered. In this performance, the humidity sensor is not covered with cloth. Consequently, maximum humidity is reached within two minutes.

APPENDIX III

FEEDBACK (2010)

Material

-Two loudspeakers: Capacity 150/170 W, frequency range 32-1800 Hz
-8 Metal pins
-Doppler flow sensor: Jumper Medical *AngelSounds Fetal Doppler*
-Elastic bands and bra closures (to attach loudspeaker and sensor to my body)
-Video camera
-Colour television
-Computer: MacBook 2.4 GHz, running Max/MSP
-Sound card: PreSonus FireBox
-Hi-fi amplifier, 2 x 100W

Technical Description

First space: I removed the cone of one of the loudspeakers and attached a small plastic square with 8 metal pins to its coil. An elastic band with bra closures is connected to the speaker in order to attach it to my back. The interior of an *AngelSounds Fetal Doppler* sensor is installed in a plastic box, which is also connected to my body with an elastic band. The signal from the Doppler sensor is led into the computer's sound card. A Max/MSP program sends the signal through a low-pass filter. The filtered signal is sent to the loudspeaker on my back, whilst the unfiltered signal is played over the loudspeaker in the second space. A video camera transmits a real-time close-up of the pins attached to the loudspeaker coil to the television in the second space.

Second space: A loudspeaker is suspended from the ceiling. Next to the loudspeaker, a colour television shows a transmission of the pins hitting the skin of my back in the first space.

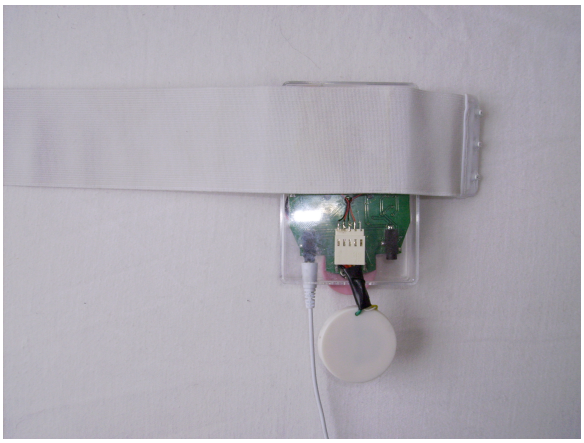

Figure III.1. Modified *AngelSounds Fetal Doppler* attached to elastic band with bra closure.

Figure III.2. Close-up of modified loudspeaker with metal pins attached to coil.

Setup

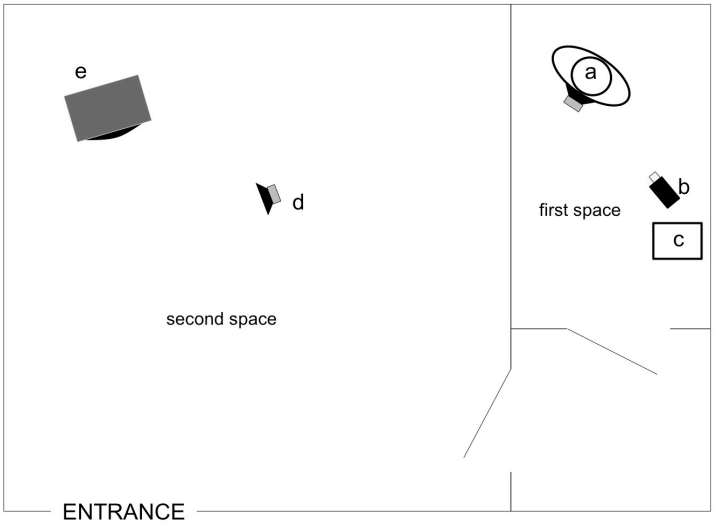

Figure III.3. Installation setup: a = performer with prepared loudspeaker on back; b = video camera; c = laptop and amplifier (on floor); d = loudspeaker suspended from ceiling; e = television

APPENDIX IV
ELECTRODE (2011)

Material

-*Anuform*® anal electrode

-*Peritone* EMG sensor

-Optocoupler (20 LDRs attached to *Peritone* sensor)

-Arduino Duemilanove board, connected to two 8-channel 4051 CMOS multiplexers

-Computer: MacBook 2.4 GHz, running Max/MSP programming language

-Sound card: PreSonus FireBox

-Video projector

-Two active loudspeakers (min. 200W)

-Packaging material and instruction manuals of electrode and sensor

-Spotlight

Description

Anuform® and *Peritone* are biofeedback devices for the treatment of incontinence problems. The Peritone sensor has 20 LEDs on its front. When the subject's sphincter muscle contracts, different LEDs light up. I attached 20 light dependent resistors (LDRs) to the LEDs on the sensor. The resistance of these LDRs is monitored by an Arduino board, which is connected to the computer. The Arduino board has only 6 analogue inputs. Therefore, I connected two 8-channel 4051 CMOS multiplexer chips to the first two pins of the Arduino. This way, the Arduino can read the resistance of 2 x 8 (two multiplexers with 8 resistors each) + 4 (connected to the 4 remaining free pins) = 20 LDRs.

The data originating from the *Peritone* sensor is used to represent the contractions of my sphincter muscle in a graph, which is projected onto the wall, and to control different parameters of Xenakis' GENDY algorithm. The sound is played over two large active loudspeakers, which are installed next to the projection surface. Packaging material and instruction manuals of the sensor and the electrode are placed on the floor around me. A spotlight illuminates my body, the sensor and the packaging material and manuals.

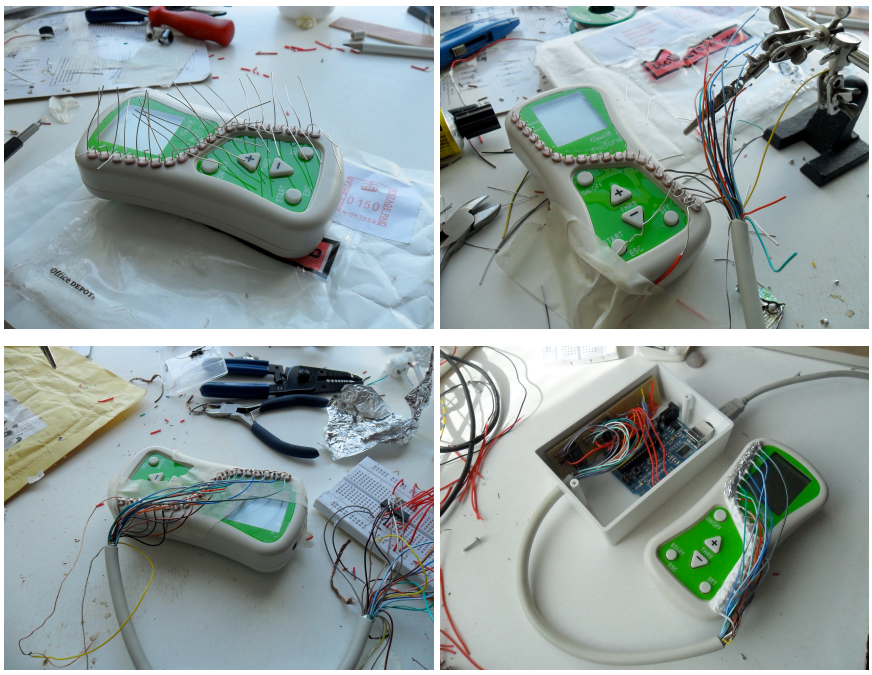

Figure IV.1. Installation of optocoupler on *Peritone* sensor

Setup

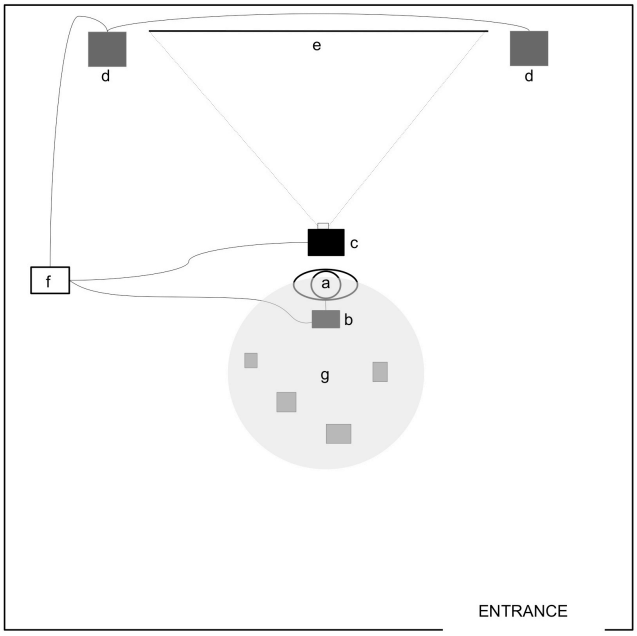

Figure IV.2. Installation setup: a = performer; b = EMG sensor; c = video projector (on floor); d = loudspeakers; e = video projection; f = laptop; g = spotlight illumination of sensor, packaging material and performer

APPENDIX V

PRESS RELEASE FOR ELECTRODE

PERFORMANCE WITH ANAL ELECTRODE IN THE BASEMENT, BRIGHTON

PhD Presentation of Dutch Performance Artist Dani Ploeger

On Friday 9 September 2011, Dutch performance artist Dani Ploeger will present his performance installation *ELECTRODE* (2011) in The Basement in Brighton. The show will be in fulfilment of the practical requirements for his PhD research project at the University of Sussex.

In *ELECTRODE*, an Anuform® anal electrode connected to a modified Peritone muscle sensor registers the activity of Ploeger's sphincter muscle. Anuform® and Peritone are readily available medical devices for the treatment of incontinence problems. In the performance, Ploeger will fake the orgasm of an anonymous subject in an experiment into the nature of the male orgasm by reproducing the contraction pattern of the subject's sphincter muscle. The data is projected onto a screen and sonified through digital sound processing algorithms.

The work forms part of Ploeger's theoretical and practical doctoral research project into the representation of bodies in digital performance art. The project investigates how consumer technologies can be used in performance art to address and challenge cultural conventions concerning the body's form and role in society.

Dani Ploeger is a Dutch artist and theorist, working in Berlin and Brighton. His artwork has been featured in museums and galleries in Europe, the United States and China and his writing has been published in academic journals in the field of cultural studies and digital arts. He is a lecturer in the Department of Performance and Digital Arts at De

Montfort University in Leicester and is currently finishing his PhD in the School of Media, Film and Music at the University of Sussex. www.danielploeger.org

Event details

dani ploeger – ELECTRODE
Friday 9 September, 8-9 pm
The Basement
24 Kensington Street
Brighton
http://www.thebasement.uk.com/
free entrance

Contact

Dani Ploeger: d.ploeger@sussex.ac.uk / 079 758 16 935
Francesca Levi (project coordinator): francesca.levi72@gmail.com / 079 541 95 301

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APPENDIX VI
REVIEW OF *ELECTRODE*

Lidové Noviny, 29 August 2011

Ostrava is a jungle of new sounds

By Pavel Klusák

[…] A bit scary looking in the catalogue, the performance of Daniel Ploeger seeked to generate music with an anal electrode. Eventually though, this was one of the most solid moments of the evening: The Dutch performer stood at the end of a long hallway. Through the backlight one could see the silhouette of his naked body with a cable inserted from below. The tiles of the former miners bathroom completed the atmosphere of experimentation on human bodies that the performance evoked. The 'Jimi Hendrix of the sphincter' gave the sounds from the body's interior interesting timbres by means of electronic filters. […]

(translation: Eva Spisarová)

APPENDIX VII
CORRESPONDENCE WITH A JOURNALIST

Re: Thesis questions

From: A[redacted]
Sent: Mon 11/21/11 1:52 PM
To: Daniel Ploeger (d_ploeger@hotmail.com)

Dani,

So sorry for the delay.

Here are my answers. To be honest I always felt bad about that article and this reads like a confession. I want to be truthful, even if it shows my trade in a bad light. You would be right to be a bit cross after giving up a morning to meet me. This is why:

It started off when my editor asked me to look into your story. She saw you listed on the Sussex uni website, and got it into her head that you were getting funded by the Arts Council to (her words) "play the bum trumpet".

She envisioned a tabloid/Daily Mail story, where we whip up 'anger' from people like the Taxpayers' Alliance. The line would be - 'what a waste of money in a time of austerity for so-called 'art'. The article was going to poke fun at what you were doing, using the tag 'bum-trumpet' to invite ridicule.

When I met you, I quickly realised your performance was serious and actually very interesting. Although I have to write dumb articles from time to time (not all the time) I'm not dumb, and perhaps because I studied critical theory at university I was really interested in what you had to say.

I rapidly decided the article would not work in the way we had envisioned. My photographer Darren also realised you would not be prepared to take part in a series of cheeky 'bum-trumpet' photos. Finally, you were not being funded to do your work. No story.

I explained the situation to my editor, who agreed with me. I had been in touch with journalists at the Mirror and the Sun, who also saw it was no longer a story. We showed them the photos, and a summary of what your piece is about.

Basically it didn't work because you can't get a serious appreciation of contemporary art in the news pages (or any pages) of a tabloid newspaper.

I did consider trying the piece out for the Arts section of a broadsheet, but I was told I would never get it in, and we would never be paid. As an agency, we mainly report news stories and Arts and Features get taken care of in London. I am constantly being driven by what we can get in the papers and the need to be paid for it by them.

I think it did not work because our media have one default setting....they take a sneering, cost-driven attitude to anything they don't understand.

The papers cater for the mythical 'average bloke' (it normally is a man) who is (allegedly) suspicious of anything different or hard to understand. They patronise their readers instead of educating them.

Believe me, I struggle with this, and my role in the industry every day. I still think on balance it is worth it. Without the tabloids, a huge swathe of the population would be totally uninformed about

the events of the day. And some of the investigative work, and the holding-to-account, they do is fantastic.

Every young journalist is torn between the ideals that drove them into the job, and the need to compromise to get on in the industry. But now I am straying into self-justification.

We have a sales-driven, timid media, scared to be elitist and largely driven by prejudice not curiosity. Even the so-called high-brow papers such as the Guardian are surprisingly conformist.

I was a bit reluctant to tell you all this, partly because if my name became connected to such sentiments, my career would suffer...eg. if it was floating around on a web-page and a future employer came across it.

But also because I imagine you will be none too pleased that I planned to make you the subject of a set-up job, when in actual fact I thought your work was fascinating and insightful.

A